



Transport
Canada

Transports
Canada

FROM: ROUTING SYMBOL

DE: SYMBOLE D'ACHEMINEMENT

RAED

Transport Canada
1100 - 9700 Jasper Ave
Canada Place
Edmonton AB T5J 4E6



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**AERO DESIGN LTD
2013 39 AVENUE NE
CALGARY AB T2E 6R7**



Department of Transport

Supplemental Type Certificate

This approval is issued to:

Aero Design Ltd.
2013 39th Avenue North East
Calgary, Alberta
Canada T2E 6R7

Number: SH00-48

Issue No.: 5

Approval Date: December 08, 2000

Issue Date: June 09, 2006

Responsible Office:

Prairie and Northern

Aircraft/Engine Type or Model:

BELL 206L, 206L-1, 206L-3, 206L-4, 407

Canadian Type Certificate or Equivalent:

H-92

Description of Type Design Change:

Installation of Cargo Basket / External Attachment
Provisions/Auxiliary step.

**Installation/Operating Data,
Required Equipment and Limitations:**

Bell 407 only:

407 Configuration A - External Attachment Provisions Only:

Installation of the External Attachment Provisions is to be completed in accordance with Transport Canada approved, AERO Design Ltd., Document Control List DCL 700, Revision 0, dated 10 May 2006, or later approved revision.

AERO Design Ltd., Instructions for Continued Airworthiness ICA 700.90, Revision 0, dated 3 May 2006, or later accepted revision, is required with this installation.

Transport Canada approved, AERO Design Ltd., Flight Manual Supplement FMS700.91, Revision 0, dated 4 May 2006, or later approved revision, is required with this installation.

External Attachment Provisions installed in accordance with DCL700 may remain installed if the basket installation is removed.

Basis of Certification remains as defined in the applicable Type Certificate Data Sheets.

(continued on page 2)

Conditions: This approval is only applicable to the type/model of aeronautical product specified therein. Prior to incorporating this modification, the installer shall establish that the interrelationship between this change and any other modification(s) incorporated **will not** adversely affect the airworthiness of the modified product.



D.S. Austen
For Minister of Transport

TRANSFER ENDORSEMENT

A transfer of ownership requires a prior approval from the Minister.

The reissue of the certificate in the name of the transferee will be contingent upon a demonstration made by the new owner that he/she can fulfill the responsibilities of the holder as described in airworthiness manual chapter 513.

TRANSFER OF OWNERSHIP

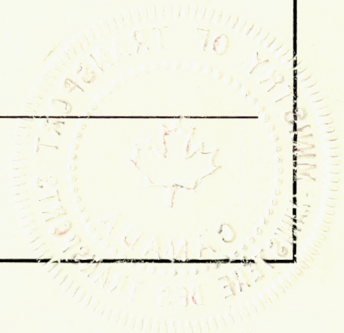
TO (NAME AND ADDRESS OF TRANSFeree)

FROM (NAME AND ADDRESS OF OWNER)

TRANSFER PARTICULARS (LICENCE
AGREEMENT, SALE OF RIGHTS, ETC.)

DATE OF TRANSFER

SIGNATURE
(OF ORIGINAL OWNER)





NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

Bell 407 only: (Continued)

407 Configuration B - External Cargo Basket Low Mounted

Installation of Configuration A, External Attachment Provisions is a prerequisite for installation of Configuration B, External Cargo Basket Installation. Installation of the External Cargo Basket is to be completed in accordance with Transport Canada approved, AERO Design Ltd., Document Control List DCL606, Revision 2, dated 10 May 2006, or later approved revision. High skid gear is required for the basket installation. Placard is required on the basket lid.

Transport Canada approved, AERO Design Ltd., Flight Manual Supplement FMS 606.01, Revision 1, dated 01 February 2005, or later approved revision, is required with this installation.

AERO Design Ltd. Instructions for Continued Airworthiness ICA492.90, Revision 0, dated 4 May 2006, or later Transport Canada accepted revision, is required with this installation.

Basis of Certification remains as defined in the applicable Type Certificate Data Sheets.

407 Configuration C - External Cargo Basket Installation High Mounted

Installation of Configuration A, External Attachment Provisions is a prerequisite for installation of Configuration C, External Cargo Basket Installation. Installation of the External Cargo Basket is to be completed in accordance with Transport Canada approved, AERO Design Ltd., Document Control List DCL606-1, Revision 0, dated 1 February 2005, or later approved revision. Approved emergency exit "push out" windows or an approved sliding door are required on the side of the helicopter that the basket is installed on if passengers are to be carried. Placard required on the basket lid.

Transport Canada approved AERO Design Ltd., Flight Manual Supplement FMS 606.01 Revision 1 dated 01 February 2005, or later approved revision, is required with this installation.

(continued on page 3)



NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

Bell 407 only: (Continued)

407 Configuration C - External Cargo Basket Installation High Mounted (continued)

AERO Design Ltd., Maintenance Instructions MI606.01 Revision 2, dated 19 July 2004, or later accepted revision, are required with this installation.

Basis of Certification remains as defined in the applicable Type Certificate Data Sheets.

407 Configuration C- External Cargo Basket Installation Low Mounted Quick Release

Installation of Configuration A, External Attachment Provisions, is a prerequisite for installation of Configuration D, External Cargo Basket Installation. Installation of the Cargo Basket is to be completed in accordance with Transport Canada approved AERO Design Ltd., Document Control List DCL 701, Revision 0, dated 10 May 2006, or later approved revision. High skid gear is required for the basket installation. Placard required on the lid.

Transport Canada approved, AERO Design Ltd., Flight Manual Supplement FMS701.90, Revision 0, dated 5 May 2006, or later approved revision is required with this installation.

AERO Design Ltd., Instructions for Continued Airworthiness ICA 698.90, Revision 0, dated 20 April 2006, or later accepted revision is required with this installation.

Basis of Certification is defined by the applicable Type Certificate Data Sheets.

Bell 206L, L-1, L-3, L-4 only:

206L Series Configuration A - External Attachment Provisions Only:

Installation of the External Attachment Provisions is to be completed in accordance with Transport Canada approved, AERO Design Ltd., Document Control List DCL 493, Revision 6, dated 10 May 2006, or later approved revision.

(continued on page 4)



NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

Bell 206L, L-1, L-3, L-4 only: (continued)

206L Series Configuration A - External Attachment Provisions Only: (continued)

Transport Canada approved AERO Design Ltd. Flight Manual Supplement FMS 493.01, Revision 0, dated 19 May 2002, or later approved revision, is required with this installation.

AERO Design Ltd. Instructions for Continued Airworthiness ICA 493.90, Revision 0, dated 4 May 2006, or later Transport Canada accepted revision, is required with this installation.

External Attachment Provisions installed in accordance with DCL493 may remain installed if the basket installation is removed.

Basis of Certification is as defined in the Type Certificate Data Sheets, plus FAR27 at amendment 27-24.

206L Series Configuration B - External Cargo Basket Low Mounted:

Installation of Configuration A, External Attachment Provisions is a prerequisite for installation of Configuration B, External Cargo Basket installation. Installation of the cargo basket is to be completed in accordance with Transport Canada approved, AERO Design Ltd., Document Control List DCL492, Revision 5, dated 10 May 2006, or later approved revision. High skid gear is required for the basket installation. Placard is required on the basket lid.

Transport Canada approved AERO Design Ltd., Flight Manual Supplement FMS 492.01, Revision 1, dated 25 June 2002, or later approved revision, is required with this installation.

AERO Design Ltd., Instructions for Continued Airworthiness ICA492.90, Revision 0, dated 4 May 2006, or later Transport Canada accepted revision, is required with this installation.

Basis of Certification is as defined in the Type Certificate Data Sheets, plus FAR27 at amendment 27-24.

(continued on page 5)



NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

206L Series Configuration C - External Cargo Basket Installation Low Mounted Quick Release

Installation of Configuration A, External Attachment Provisions, is a prerequisite for installation of Configuration C, External Cargo Basket Installation. Installation of the Cargo Basket is to be completed in accordance with Transport Canada approved AERO Design Ltd., Document Control List DCL 702, Revision 0, dated 10 May 2006, or later approved revision. High skid gear is required for the basket installation. Placard required on the lid.

Transport Canada approved, AERO Design Ltd., Flight Manual Supplement FMS702.90, Revision 0, dated 5 May 2006, or later approved revision is required with this installation.

AERO Design Ltd., Instructions for Continued Airworthiness ICA 698.90, Revision 0, dated 20 April 2006, or later accepted revision is required with this installation.

Basis of Certification is defined by the applicable Type Certificate Data Sheets, plus FAR 27 amendment 27-30.

All Models (Bell 206L series and 407)

Auxiliary Step Installation:

Installation of the Auxiliary Step is to be completed in accordance with Transport Canada approved, AERO Design Ltd., Document Control List DCL623, Revision 0, dated 13 Jan 2005, or later approved revision.

The auxiliary step is optional and is not required with installation of Configuration B or C.

Auxiliary Step installed in accordance with DCL623 may remain installed if the basket installation is removed.

Basis of Certification is as defined in the Type Certificate Data Sheets, plus FAR27 amendment 27-30.
(continued on page 6)



NOTE: THIS ADDENDUM SHALL REMAIN PART OF THE CERTIFICATE REFERRED TO THEREIN.

All Models (Bell 206L series and 407)(continued)

Cargo Basket Modifications:

Modifications to the cargo basket configurations are eligible in accordance with Transport Canada approved, AERO Design Ltd., Document Control List DCL704, Revision 0, dated 10 May 2006, or later approved revision. Eligibility limitations are noted on the drawings.

— End —

DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION
INSTALLATION DOCUMENTS		
60602	External Attachment Provisions Installation	0
FMS700.91	Flight Manual Supplement	0
ICA700.90	Instructions for Continued Airworthiness	0
FABRICATION DOCUMENTS		
60620	Block Fabrication	0
60621	Forward Fitting	1
60622	Barrel Nut Fabrication	0
60624	Barrel Nut Fabrication	0
ENGINEERING DOCUMENTS		
ER606.01	Engineering Report	0
ER606.02	Engineering Report	0
ER493.01	Engineering Report	0
<div> <div> APPROVAL:  <div> Transport Canada </div> </div> <div> Transport Canada </div> </div> <div> AIRCRAFT CERTIFICATION DIVISION APPROVED By <u>D. S. Austin</u> Appr'l No. <u>SH100-48</u> Appr'l Date <u>00-12-08</u> Issue No. <u>5</u> Issue Date <u>06-06-09</u> YY - MM - DD </div>		

ORIGINAL DATE:
10 May, 2006
REVISION DATE:

AERO DESIGN LTD.
2013 - 39th Ave NE, Calgary, Alberta, T2E 6R7
Ph. (403) 250-8027
Fax. (403) 250-8333

SHEET 1 OF 1

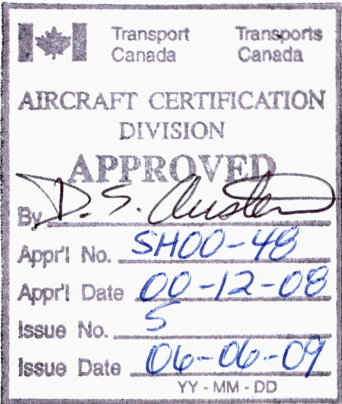
**External Attachment
Provisions Installation**

DCL700



Rev.
0

DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION
INSTALLATION DOCUMENTS 49201 FMS492.01 ICA492.90	Cargo Basket Installation Flight Manual Supplement Instructions for Continued Airworthiness	2 1 0
FABRICATION DOCUMENTS DCL492-1	Document Control List for Side-Mounted Cargo Basket Assembly	0
ENGINEERING DOCUMENTS		

APPROVAL: 	ORIGINAL DATE: 17 May, 2002 REVISION DATE: 10 May, 2006	AERO DESIGN LTD. 2013 – 39 th Ave. NE Calgary, Alberta T2E 6R7 Ph. (403) 250-8027 Fax. (403) 250-8333
	SHEET 1 OF 1	BELL 206L SERIES Side-Mounted Cargo Basket Installation
	<div> <div>DCL492</div> <div>Rev. 5</div> </div>	

DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION
INSTALLATION DOCUMENTS		
60601	Cargo Basket Installation	1
FMS606.01	Flight Manual Supplement	1
ICA492.90	Instructions for Continued Airworthiness	0
FABRICATION DOCUMENTS		
DCL492-1	Document Control List for Side-Mounted Cargo Basket Assembly	0
ENGINEERING DOCUMENTS		
ER606.01	Engineering Report – Basket Installation	0
ER606.02	Engineering Report – Load Test	0
APPROVAL:	<div> <div>  <div> Transport Canada </div> </div> <div>  <div> Transports Canada </div> </div> </div> <div> AIRCRAFT CERTIFICATION DIVISION APPROVED By <i>D. S. Austin</i> App'l No. <u>SH00-48</u> App'l Date <u>00-12-08</u> Issue No. <u>5</u> Issue Date <u>06-06-09</u> YY - MM - DD </div>	

ORIGINAL DATE:
31 May, 2004

REVISION DATE:
10 May, 2006

AERO DESIGN LTD.
2013 - 39th Avenue N.E.
Calgary, Alberta
T2E 6R7
Ph. (403) 250-8027
Fax. (403) 250-8333




DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION
INSTALLATION DOCUMENTS		
70101	Quick Release Cargo Basket Installation	0
ICA698.90	Instructions for Continued Airworthiness	0
FMS701.90	Flight Manual Supplement	0
FABRICATION DOCUMENTS		
DCL698-1	Document Control List for Quick Release Cargo Basket	0
DCL698-2	Document Control List for Beams	0
ENGINEERING DOCUMENTS		
APPROVAL:		
 <div style="display: flex; justify-content: space-between;"> <div> <p>Transport Canada</p> <p>AIRCRAFT CERTIFICATION DIVISION</p> <p>APPROVED</p> <p>By <u>D. S. Austen</u></p> <p>Appr'l No. <u>SH00-48</u></p> <p>Appr'l Date <u>00-12-08</u></p> <p>Issue No. <u>5</u></p> <p>Issue Date <u>06-06-09</u></p> <p style="font-size: small;">YY - MM - DD</p> </div> <div> <p>Transports Canada</p> </div> </div>	<p>ORIGINAL DATE:</p> <p>10 May, 2006</p> <p>REVISION DATE:</p>	<p style="text-align: center;">AERO DESIGN LTD.</p> <p style="text-align: center;">2013 – 39th Ave NE, Calgary, Alberta, T2E 6R7</p> <p style="text-align: center;">Ph. (403) 250-8027</p> <p style="text-align: center;">Fax. (403) 250-8333</p>
	SHEET 1 OF 1	<p>Bell 407</p> <p>Quick Release Cargo Basket Installation</p>
	DCL701	<p>Rev.</p> <p style="font-size: 2em; font-weight: bold;">0</p>


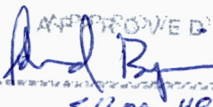
DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION	
INSTALLATION DOCUMENTS			
70201	Quick Release Cargo Basket Installation	0	
ICA698.90	Instructions for Continued Airworthiness	0	
FMS702.90	Flight Manual Supplement	0	
FABRICATION DOCUMENTS			
DCL698-1	Document Control List for Quick Release Cargo Basket	0	
DCL698-2	Document Control List for Beams	0	
ENGINEERING DOCUMENTS			
APPROVAL:			
 <div> <div>Transport Canada</div> <div>Transports Canada</div> </div> <div> AIRCRAFT CERTIFICATION DIVISION APPROVED By <i>D. S. [Signature]</i> App'l No. <u>SH00-48</u> App'l Date <u>00-12-08</u> Issue No. <u>5</u> Issue Date <u>06-06-09</u> YY - MM - DD </div>	ORIGINAL DATE: 10 May, 2006	AERO DESIGN LTD. 2013 – 39 th Ave NE, Calgary, Alberta, T2E 6R7 Ph. (403) 250-8027 Fax. (403) 250-8333	
	REVISION DATE:		
	SHEET 1 OF 1	Bell 206L Series Quick Release Cargo Basket Installation	
	DCL702		Rev. 0


DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION	
FABRICATION DOCUMENTS			
69810	Cargo Basket Assembly	0	
69811	Basket Body Assembly	0	
69812	Basket Lid Assembly	0	
69821	Basket Components - End Hoop	0	
69823	Basket Components - Lugs	0	
69824	Basket Components - Rim	0	
69825	Basket Components - Spine	0	
69826	Basket Components - Strut	0	
69827	Basket Components - Placard	0	
49210	Basket Components - Hoops	1	
49212	Basket Components - Rim	0	
49213	Basket Components - Lid Brace	1	
49215	Basket Components - Spacer	0	
49216	Basket Components - Spacer	0	
36255	Handle Assembly	1	
36261	Handle Bar Assembly	1	
36262	Handle Bracket Assembly	1	
36271	Handle Lever	0	
36272	Basket Bracket	0	
36273	Lid Bracket	0	
36274	Bushing	0	
36275	Bushing	1	
36276	Spring Hook	0	
36277	Handle Bar	0	
36278	Spring	1	
36280, Sheet 1	Brace	2	
36280, Sheet 2	Brace	2	
ENGINEERING DOCUMENTS			
ER698.01	Engineering Report	0	
APPROVAL:			
 <div style="display: inline-block; vertical-align: top; margin-left: 10px;"> Transport Canada TRANSPORTS Canada AIRCRAFT CERTIFICATION DIVISION APPROVED By <u>D.S. Austin</u> Appr'l No. <u>SH00-48</u> Appr'l Date <u>00-12-08</u> Issue No. <u>5</u> Issue Date <u>06-06-09</u> <small>YY - MM - DD</small> </div>	ORIGINAL DATE: 3 May, 2006	AERO DESIGN LTD. 2013 - 39 th Ave NE, Calgary, Alberta, T2E 6R7 Ph. (403) 250-8027 Fax. (403) 250-8333	
	REVISION DATE:		
		SHEET 1 OF 1	Quick Release Cargo Basket Assembly
		DCL698-1	Rev. 0

DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION
FABRICATION DOCUMENTS		
69830 69831	Forward Beam Fabrication Aft Beam Fabrication	1 1
ENGINEERING DOCUMENTS		
ER698.02 TP698.03	Engineering Report Test Plan	0 0
<div> <div> APPROVAL:  Transport Canada G. BURGAIN DARTMOUTH APPROVED By  Project No. 51600-48 Date 08 DEC 2006 Signature S Date 09 JUNE 2006 THIS DOC APPROVED 26 SEPT 2006 </div> <div> ORIGINAL DATE: 3 May, 2006 REVISION DATE: 21 September, 2006 </div> <div> AERO DESIGN LTD. 2013 – 39th Ave NE, Calgary, Alberta, T2E 6R7 Ph. (403) 250-8027 Fax. (403) 250-8333 </div> </div>		
SHEET 1 OF 1		Quick Release Mounting Beams
DCL698-2		Rev. 1

DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION
FABRICATION DOCUMENTS		
69830	Forward Beam Fabrication	0
69831	Aft Beam Fabrication	0
ENGINEERING DOCUMENTS		
ER698.02	Engineering Report	0
TP698.03	Test Plan	0
APPROVAL:		
 <p>By <u>D. S. Austen</u> Appr'l No. <u>SH00-48</u> Appr'l Date <u>00-12-08</u> Issue No. <u>5</u> Issue Date <u>06-06-09</u> YY-MM-DD</p>	ORIGINAL DATE: 3 May, 2006	AERO DESIGN LTD. 2013 - 39 th Ave NE, Calgary, Alberta, T2E 6R7 Ph. (403) 250-8027 Fax. (403) 250-8333
	REVISION DATE:	
		SHEET 1 OF 1
DCL698-2		Rev. 0

FORM AE-100

DEPARTMENT OF TRANSPORT STATEMENT OF COMPLIANCE OF AIRCRAFT OR AIRCRAFT COMPONENTS WITH THE AIRWORTHINESS REQUIREMENTS		AE-100 No.: AE766-1 Initial Issue Date: 31 October, 2007 Revision: 1 Revision Date: 23 September, 2008 Approval No.: SH00-48 Delegation No.: 290M Delegate Name: E. Burgoin Classification of Designee: Company: AERO Design Ltd.
Aircraft Mfr: Bell Aircraft Model: 206L Series and 407 Registration: ALL ELIGIBLE	Model Type Airplane <input type="checkbox"/> Helicopter <input checked="" type="checkbox"/> Appliance <input type="checkbox"/> Component <input type="checkbox"/>	

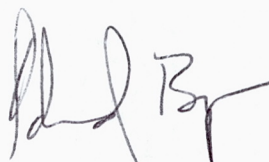
LIST OF APPROVED REPORTS AND DATA

Document Number	Revision	Document Title	Compliance Status
DCL766-1	1	Document Control List and all documents referred to therein	As per Compliance Program, CP766, Revision 0
SI698.91	0	Service Instructions – Sliding Door Modification	
		DATA APPROVED BY TRANSPORT CANADA	

CERTIFICATION

UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED Nil HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH THE PERTINENT COMPLIANCE REQUIREMENTS.

I THEREFORE ☐ RECOMMEND FOR APPROVAL OF THESE DATA
☒ APPROVE THESE DATA


 E. Burgoin, DAR 290M

DOCUMENT CONTROL LIST

DOCUMENT NO.	DOCUMENT CONTENT	REVISION
INSTALLATION DOCUMENTS		
76601	Cargo Basket Installation	0
ICA766.90	Instructions for Continued Airworthiness	0
FMS766.91	Flight Manual Supplement (Bell 407)	0
FMS766.92	Flight Manual Supplement (Bell 206L)	0
FABRICATION DOCUMENTS		
DCL766-2	Document Control List for Quick Release High Basket Assembly	0
APPROVAL:		
 Transport Canada TRANSPORTS Canada AIRCRAFT CERTIFICATION DIVISION APPROVED By <u>D. S. [Signature]</u> Appr'l No. <u>SH00-48</u> Appr'l Date <u>00-12-08</u> Issue No. <u>6</u> Issue Date <u>08-01-30</u> YY-MM-DD	ORIGINAL DATE: 26 September, 2007 REVISION DATE:	AERO DESIGN LTD. 2013 - 39 th Ave NE Calgary, Alberta T2E 6R7 Ph. (403) 250-8027 Fax. (403) 250-8333
	SHEET 1 OF 1	Bell 206L and 407 High Side-Mounted Cargo Basket Installation
	DCL766-1	
		Rev. 0



Transport
Canada

Transports
Canada

1100-9700 Jasper Avenue
Edmonton, Alberta T5J 4E6

Your file Votre référence

January 31, 2008

Our file Notre référence

C-07-1033
SH00-48

Aero Design Ltd.
2013 39th Avenue North East
Calgary, Alberta
Canada, T2E 6R7

**SUBJECT: REVISION TO SUPPLEMENTAL TYPE CERTIFICATE NO. SH00-48 – ISSUE 6
DATED JANUARY 30, 2008 – INSTALLATION OF CARGO
BASKET/EXTERNAL ATTACHMENTS PROVISIONS/AUXILIARY STEP
BELL 206L, 206L-1, 206L-3 AND 206L-4 – ISSUED TO AERO DESIGN LTD.**

This Supplemental Type Certificate (STC) is issued in response to your application. Included with the STC are the documents bearing the original Transport Canada signatures.

The transfer of this SH00-48 in the name of another person requires the prior approval from the Minister in accordance with Canadian Aviation Regulations (CAR) 513.25.

The requirements of CAR 561 apply where parts are manufactured and offered for sale. The provisions of CAR 571.06(4) should also be consulted.

A Canadian holder is required to report any service problem experienced with their product. Therefore, should you become aware of any defect, malfunction or failure resulting from the design change, it is your responsibility to submit a Service Difficulty Report to Transport Canada in accordance with CAR V, Subpart 91.

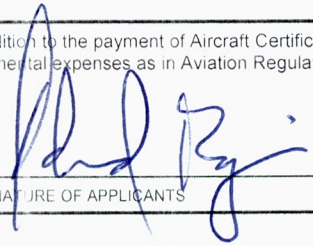

Yours truly,

J. Staal
Aircraft Certification Engineering Technologist
Prairie and Northern Region
Phone: 780-405-5227
Facs: 780-495-7963

Encl.

MODIFICATION APPROVAL REQUEST APPLICATION FORM

MOD766, Rev. 0

1. NAME AND ADDRESS OF APPLICANT:		2. IDENTIFICATION OF PRODUCT				
AERO Design Ltd. 2013 - 39th Avenue NE Calgary, Alberta T2E 6R7		MAKE: Bell		MODEL: 206L Series, 407		
ALL CORRESPONDANCE TO: AERO Design Ltd. 2013 - 39th Avenue NE Calgary, Alberta T2E 6R7		SERIAL No.: All Eligible		REGISTRATION: All Eligible		
3. REQUEST FOR:						
A. SUPPLEMENTAL TYPE CERTIFICATE (STC)		<input type="checkbox"/>				
B. STC/STA REVISION		<input checked="" type="checkbox"/> STC/STA No. SH00-48				
C. LIMITED SUPPLEMENTAL TYPE CERTIFICATE (LSTC)		<input type="checkbox"/>				
D. LIMITED STC/STA REVISION		<input type="checkbox"/> LSTC/LSTA No.				
E. F.A.A. SUPPLEMENTAL TYPE CERTIFICATE		<input type="checkbox"/>				
F. F.A.A. STC REVISION		<input checked="" type="checkbox"/> STC No. SR02253NY				
G. FAMILIARIZATION OF F.A.A. STC		<input type="checkbox"/> STC No.				
H. REPAIR DESIGN APPROVAL (RDC)		<input type="checkbox"/>				
I. PARTS DESIGN APPROVAL (PDA)		<input type="checkbox"/>				
C-07-1033						
4. TITLE OF MODIFICATION OR REPAIR: Quick Release Cargo Basket Installation						
5. BRIEF DESCRIPTION OF MODIFICATION OR REPAIR: Installation of a high mounted cargo basket that does not require tools so as to allow a pilot to install or remove the basket in the field without support from an AME. Minor updates to the remainder of the approval are also included.						
6. APPLICABLE TYPE APPROVAL (TA) OR TYPE CERTIFICATE (TC) DOCUMENTS:						
A. TA NO. H-92 B. TC No. C. OTHER						
7. PROPOSED BASIS OF APPROVAL:						
A. SAME AS TA <input checked="" type="checkbox"/> B. SAME AS TC <input type="checkbox"/> C. OTHER <input type="checkbox"/> (Please specify)						
8. DOCUMENTATION CHECKLIST		REQUIRED		FOR DOT USE ONLY		
				RECEIVED		
		YES	NO	YES	NO	DATE
COMPL ANCE PROGRAM		X				
MASTER DRAWING LIST		X				
FLIGHT MANUAL SUPPLEMENT		X				
MAINTENANCE MANUAL SUPPLEMENT			X			
INSTRUCTIONS FOR CONTINUING AIRWORTHINESS		X				
ENGINEERING REPORTS		X				
DESIGN DRAWINGS			X			
MANUFACTURE DRAWINGS & INSTALLATION INSTRUCTIONS		X				
ELECTRICAL LOAD ANALYSIS			X			
DRAFT STC, LSTC OR RDA			X			
WEIGHT AND MOMENT CHANGE		X				
FLIGHT TEST DATA		X				
OTHER (Specify)						
9. APPLICANT'S REMARKS:						
10. In addition to the payment of Aircraft Certification approval fees as prescribed in Canadian Aviation Regulations (CAR) Section 104, I agree to reimburse Transport Canada incremental expenses as in Aviation Regulation Directive No. 3, or equivalent, as applicable. For further details governing cost recovery, refer to AMA 513/4						
PER: 		Consultant		31 October, 2007		
SIGNATURE OF APPLICANTS		TITLE		DATE		
11.						
				17 Jan 2008		
SIGNATURE OF REGIONAL ENGINEER				DATE		

AIRWORTHINESS REQUIREMENTS COMPLIANCE PROGRAM

APPLICANT: AERO Design Ltd.
2013 39th Avenue NE
Calgary, Alberta, T2E 6R7

DATE: 31 October, 2007
REV. No. 0

CORRESPONDANCE TO:
(If other than applicant)

MAKE: Bell Helicopter
MODEL: 206L Series, 407

REGISTRATION: All Applicable
SERIAL No.: All Applicable

NATURE OF WORK: Installation of High Side-Mounted Quick Release External Cargo Basket

MODEL CERTIFICATION BASIS: FAR 27, Amendment 27-30, with exceptions as noted below. (Bell 407, highest of 206L Series and 407)

MODIFICATION CERTIFICATION BASIS: FAR 27, Amendment 27-30, with exceptions as noted below.

Airworthiness Requirement		Subject for Compliance or Documentary Proof	Form of Substantiation	DOT	DAR	Comments
Paragraph	Amdt.					
Subpart B – Flight						
27.27	30	Centre of Gravity Limits	N/A			No change from Type Approval.
27.29	30	Empty Weight and Corresponding C of G	Data specified on inst'n drawing		X	
27.51	30	Takeoff	Flight Test	X	}	Flight tests performed using similar baskets of Bell 206L and 407 to satisfy the flight test requirements. Limitations established in previous flight tests to be used with this installation.
27.65	30	Climb: All Engines Operating	Flight Test	X		
27.71	30	Gliding Performance	Flight Test	X		
27.75	30	Landing	Flight Test	X		
27.141	30	Flight Characteristics – General	Flight Test	X		
27.143	30	Controllability and Maneuverability	Flight Test	X		
27.151	30	Flight controls	Flight Test	X		
27.161	30	Trim	Flight Test	X		
27.171	30	Stability – General	Flight Test	X		
27.173	1	Longitudinal Stability	Flight Test	X		
27.175	1	Demonstration of Longitudinal Stability	Flight Test	X		
27.177	30	Static Directional Stability	Flight Test	X		
27.241	30	Ground Resonance	Flight Test	X		
27.251	30	Vibration	Flight Test	X		
Subpart C – Strength Requirements						
27.301	30	Loads – Air Drag Loads	Analysis		X	
27.301	30	Loads – Inertia Loads	Compliance with 27.337 and 27.561		X	

AIRWORTHINESS REQUIREMENTS COMPLIANCE PROGRAM

Airworthiness Requirement	Subject for Compliance or Documentary Proof	Form of Substantiation	DOT	DAR	Comments
Paragraph	Amdt.				
27.303	30	Factor of Safety		X	
27.305	30	Strength and Deformation		X	
27.307	30	Proof of Structure		X	
27.337(a)	30	Limit Maneuvering Load Factor – Positive		X	Critical load factor in downward direction.
27.471	30	Ground Loads - General	X <i>ph</i>		External Attachment fittings already approved on STC SH00-48 are used for this installation
27.473	30	Ground Loading Conditions and Assumptions			No change to assumptions used for Type Approved configuration
27.501	30	Ground Loading Conditions – Landing Gear with Skids	X <i>ph</i>		Loads from the cargo basket on the landing gear fittings do not use skid tubes or cross tubes in load path.
27.547	30	Main Rotor Structure	X <i>ph</i>		See comments for flight test above
27.561	30	Emergency Landing Conditions		X	
27.561(b)3(i)	24	Emergency Landing Conditions – Up		X	
27.561(b)3(ii)	24	Emergency Landing Conditions – Fwd			Testing performed IAW TP766.02
27.561(b)3(iii)	24	Emergency Landing Conditions – Side		X	
27.561(b)3(iv)	24	Emergency Landing Conditions – Down		X	27.337 Maneuvering Load is Critical.
Subpart D – Design and Construction					
27.601	30	Design		X	Design is conventional.
27.603	30	Materials		X	Materials used are specified in Mil-Hdbk-5H.
27.605	30	Fabrication Methods		X	Design is conventional.
27.609	30	Protection of Structure		X	
27.611	30	Inspection Provisions		X	Design is easy to inspect.
27.613	30	Material Strength Properties and Design Values		X	
27.625	30	Fitting Factor		X	
27.725	30	Limit Drop Test			Ref. TCDS Equivalent Safety Finding. Landing gear loads on fitting to be assessed by comparison with ultimate strength of original Type Approved fitting, and test as required.
27.727	30	Reserve Energy Absorption Drop Test			Installation does not block cabin door on left side.
27.783	30	Doors			
27.787(a)	30	Cargo and Baggage Compartments		X	
27.787(b)	30	Cargo and Baggage Compartments		X	Basket is a closed container.
27.787(c), (d)	30	Cargo and Baggage Compartments			Cargo is external to helicopter.

AIRWORTHINESS REQUIREMENTS COMPLIANCE PROGRAM

Airworthiness Requirement	Subject for Compliance or Documentary Proof		Form of Substantiation	DOT	DAR	Comments
Paragraph	Amdt.					
27.807	30	Emergency Exits	Statement in report		X	Installation does not block sliding doors in outboard configuration, pop-out windows are required for inboard configuration
27.865(a)	30	External Load Attaching Means	Compliance with 27.337		X	
27.865(b), (c)	30	External Load Attaching Means	N/A			
27.865(d)	30	External Load Attaching Means	N/A			Failure of an attachment does not endanger the rotorcraft.
27.1387	30	Position Light System Dihedral Angles	N/A			No change from Type Approval.
27.1401	30	Anticollision Light System	Statement	X	9	Light located at FS 396, WL 130 on vertical fin. Basket has no significant effect on visibility of anticollision light. only quick release added
Subpart G – Operating Limitations and Information						
27.1505	30	Never Exceed Speed	Flight Test, Flight Manual Supplement	X	9	V _{NE} limits as specified in the existing Flight Manual (140 kts.)
27.1525	30	Kinds of Operation	Flight Manual Supplement	X	9	Limited to VFR only. — see F/T report
27.1529	30	Instructions for Continuing Airworthiness	ICA Provided	X	9	In previous issues.
27.1557(a)	30	Miscellaneous Markings and Placards – Baggage Compartments	Placard		X	
27.1557(b)	30	Miscellaneous Markings and Placards	N/A			
27.1557(c)	30	Miscellaneous Markings and Placards	N/A			
27.1557(d)	30	Miscellaneous Markings and Placards	N/A			
27.1581	30	Rotorcraft Flight Manual – General	Flight Manual Supplement	X	9	
27.1583(c)	30	Operating Limitations – Weight and Loading Information	Flight Manual Supplement	X	9	
27.1585	30	Operating Procedures	Flight Manual Supplement	X	9	
27.1587	30	Performance Information	Flight Manual Supplement	X	9	
27.1589	30	Loading Information	Flight Manual Supplement & Placard	X	9	Placard installed on basket lid
Airworthiness Manual Requirements						
527.1581(e)		Rotorcraft Flight Manual – Units	SI and Imperial Units provided in Flight Manual Supplement	X	9	

AERO DESIGN LTD.

2013 – 39th Ave N. E., Calgary, Alberta, T2E 6R7

info@aerodesign.ca

F A X C O V E R S H E E T

DATE: November 5, 2007

TIME: 10:21 AM

TO: **Jack Staal**
Transport Canada

PHONE: 780-495-5227

FAX: 780-492-7963

FROM: J. Clarke
Aero Design Ltd.

PHONE: 403-250-8027

FAX: 403-250-8333

Number of pages including cover sheet: 2

RE: BELL 206L/407 CARGO BASKET

Jack,

Please find attached the signed application form for revision of our cargo basket approval.

Regards,


Jeff

1 November, 2007

Transport Canada
Aircraft Certification Division
11th Floor, Canada Place
9700 Jasper Avenue
Edmonton, Alberta
T5J 4E6

Attn: Jack Staal

Your File # : SH00-48

Our File # : Various

Re: Cargo Basket Approval Revisions

Jack,

Please find attached the following documents related to this project:

Supplemental Type Certificate (draft)

✓SH00-48 Issue 6

(High Quick Release Basket)

Document Control List

✓DCL766-1 Revision 0

Document Control List

✓DCL766-2 Revision 0

AE 100 Form

✓AE766-1 Revision 0

AE 100 Form

✓AE766-2 Revision 0

Compliance Program

✓CP766 Revision 0

Modification Approval Application Form

✓MOD766 Revision 0

Engineering Report

✓ER766.01 Revision 0

Test Plan

✓TP766.02 Revision 0

Instructions for Continued Airworthiness

✓ICA766.90 Revision 0

MSI 53 Review

✓

Flight Manual Supplement (407)

✓FMS766.91 Revision 0

Flight Manual Supplement (206L)

✓FMS766.92 Revision 0

Cargo Basket Installation

✓76601 Revision 0

Cargo Basket Assembly

✓76610 Revision 0

Cargo Basket Body

✓76611 Revision 0

Basket Components - End Hoop Assembly

✓76621 Revision 0

Basket Comp. - Attach Hoop Assembly

✓76622 Revision 0

Basket Components - Hoop

✓76623 Revision 0

Basket Components - Placard

✓76625 Revision 0

Support Beams

✓76630 Revision 0

Handle Assembly

✓36255 Revision 1

Handle Bar Assembly

✓36261 Revision 3

Handle Bracket Assembly

✓36262 Revision 1

Handle Lever

✓36271 Revision 1

Basket Bracket

✓36272 Revision 1

Lid Bracket

✓36273 Revision 1

Bushing

✓36274 Revision 1

Bushing

✓36275 Revision 2

(407 Attachment Provisions)

Document Control List

AE100 Form

Block Fabrication

✓ DCL700 Revision 1
✓ AE700 Revision 1
✓ 60620 Revision 1

(Low Fixed Basket)

Document Control List

Document Control List

AE100 Form

Cargo Basket Installation (206L)

Support Beams (Pocketed Aluminum)

Support Beams (Steel)

Engineering Report - Pocketed Beams

Instructions for Continued Airworthiness

Flight Manual Supplement

Document Control List

AE100 Form

Cargo Basket Installation (407)

Flight Manual Supplement

✓ DCL492 Revision 6
✓ DCL492-1 Revision 1
✓ AE492 Revision 2
✓ 49201 Revision 3
✓ 49221 Revision 3
✓ 49222 Revision 2
✓ ER492.04 Revision 1
✓ ICA492.90 Revision 1
✓ FMS492.01 Revision 2
✓ DCL606 Revision 3
✓ AE606 Revision 2
60601 Revision 2
✓ FMS606.01 Revision 2

(Quick Release Basket Installation)

Document Control List

AE100 Form

Cargo Basket Installation (407)

Flight Manual Supplement

Document Control List

AE100 Form

Cargo Basket Installation (206L)

Flight Manual Supplement

✓ DCL701 Revision 1
✓ AE701 Revision 1
✓ 70101 Revision 2
✓ FMS701.90 Revision 1
✓ DCL702 Revision 1
✓ AE702 Revision 1
✓ 70201 Revision 2
✓ FMS702.90 Revision 1

(Quick Release Basket Fabrication)

Document Control List

AE100 Form

Cargo Basket Assembly

Basket Body Assembly

Basket Components - End Hoop

Basket Components - Aft Hoop

Instructions for Continued Airworthiness

Document Control List

AE100 Form

Forward Beam Fabrication

Aft Beam Fabrication

Engineering Report

✓ DCL698-1 Revision 1
✓ AE698-1 Revision 1
✓ 69810 Revision 2
✓ 69811 Revision 2
✓ 69821 Revision 1
✓ 69822 Revision 0
✓ ICA698.90 Revision 1
✓ DCL698-2 Revision 2
✓ AE698-2 Revision 1
✓ 69830 Revision 2
✓ 69831 Revision 2
✓ ER698.04 Revision 0

AERO DESIGN LTD.

2013 - 39 Avenue N.E., Calgary, Alberta, T2E 6R7

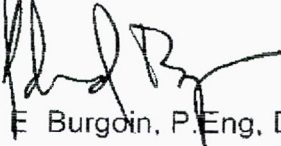
Tei 403-250-8027

Fax 403-250-8333

info@aerodesign.ca

Please note the request for a revision to the FAA STC after the Canadian approval is issued.

Regards,

A handwritten signature in black ink, appearing to read 'F. Burgoin', is written over the printed name.

F. Burgoin, P. Eng, DAR 290M

Encl

SENDER ACCOUNT NO. N° DE COMPTE DE L'EXPÉDITEUR 4367155		IMPORTANT - TÉLÉPHONE (403) 250 8027	
SENDER (FROM) / EXPÉDITEUR (DE) AERO DESIGN		MO DY/JR YR/AN 11 05 07	
STREET ADDRESS / ADRESSE (N° ET RUE) 2013 39 AVE NE		APT., SUITE / APP., BUREAU	
CITY / VILLE CALGARY	PROV./STATE/ÉTAT ALTA	POSTAL / ZIP T2E 6R7	
RECEIVER (TO) / DESTINATAIRE (A) TRANSPORT CANADA			
STREET ADDRESS / ADRESSE (N° ET RUE) 9700 JASPER AVE, 11 th FLOOR		APT., SUITE / APP., BUREAU	
CITY / VILLE EDMONTON	PROV./STATE/ÉTAT AB	POSTAL / ZIP T5J4E6	
ATTN: (NAME / DEPT.) / À L'ATTENTION DE (NOM / SERVICE) JACK STAAL		IMPORTANT - TÉLÉPHONE (780) 4955227	
DESCRIPTION (INCLUDING DANGEROUS GOODS / INCLUANT MARCHANDISES DANGEREUSES) DOCUMENTS			
SENDER REFERENCE (IF ANY) / REF. DE L'EXPÉD.		PICK UP / CUEILLETTE - N° DE CONF. 0008	

SENDER SIGNATURE / SIGNATURE DE L'EXPÉDITEUR

X

X

SEE CONDITIONS OF CARRIAGE ON REVERSE / CONDITIONS DE TRANSPORT AU VERSO

SHIP MODE / MODE DE TRANSPORT			
AIR AÉRIEN <input checked="" type="checkbox"/>		GROUND ROUTIER <input type="checkbox"/>	
PKG / EMBAL.		SERVICE	
1 CHOISIR TYPE ONLY TYPE SEULEMENT	PUR- LETTER <input type="checkbox"/>	1 PIÈCE ONLY PIÈCE SEULEMENT	9 AM 9 h <input type="checkbox"/>
	PUR- PAK <input checked="" type="checkbox"/>		10:30 AM 10 h 30 <input type="checkbox"/>
	OTHER AUTRE <input type="checkbox"/>		SAT. SAM. <input type="checkbox"/>
	PAYMENT / PAIEMENT		
CASH COMPTANT <input type="checkbox"/>		CREDIT CARD CARTE DE CRÉDIT <input type="checkbox"/>	
RECEIVER OR THIRD PARTY ACCOUNT NO. / N° DE COMPTE DU DESTINATAIRE OU TIERS			
RECEIVER DESTINA- TAIRE <input type="checkbox"/>		3RD PARTY TIERS <input type="checkbox"/>	
SENDER EXPÉDITEUR <input checked="" type="checkbox"/>			
SHIPMENT / DÉTAILS / EXPÉDITION			
#/Nbre PCS (4 MAXIMUM) 1	WEIGHT / POIDS SUBJ. TO CORR. / SUJET À CORR.		
	KG	LB 2	
DECLARED VALUE / VALEUR DÉCLARÉE (SURCHARGE APPLIES OVER \$100) (SUPPLÉMENT AU-DESSUS DE 100 \$) \$ 5,000 MAX. MAX 5 000 \$			
SEE CONDITIONS OF CARRIAGE ON REVERSE / CONDITIONS DE TRANSPORT AU VERSO			

BILL OF LADING NO.
-NOT NEGOTIABLE
N° DE CONNAISSANCE
-NON NÉGOCIABLE

2747 320 1971



1 888 SHIP-123

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COURIER INITIALS INITIALES DU COURRIER		COURIER ROUTE ITINÉRAIRE DU COURRIER		MO DY/JR YR/AN	
<input type="checkbox"/>		let		11 5	
NO./N°		TYPE <input type="checkbox"/> VISA <input type="checkbox"/> MC <input type="checkbox"/> AMEX			EXP. DATE D'EXP.

CHARGES FRAIS TOTAL AMOUNT / MONTANT TOTAL	
THIRD PARTY BILLING NAME & ADDRESS / FACTURATION À UN TIERS (NOM & ADRESSE)	

LIMITATION OF LIABILITY - IMPORTANT - PLEASE READ
THE AMOUNT OF ANY LOSS OR DAMAGE FOR WHICH THE CARRIER MAY BE LIABLE SHALL NOT EXCEED \$2.00 PER POUND (OR \$4.41 PER KILOGRAM) COMPUTED ON THE TOTAL WEIGHT OF THE SHIPMENT UNLESS A HIGHER VALUE IS DECLARED ON THE FACE OF THE BILL OF LADING BY THE CONSIGNOR (SENDER). MAXIMUM DECLARED VALUE SHALL NOT EXCEED \$5,000. N.B. NOTE CAREFULLY CONDITIONS ON BACK HEREOF INCLUDING LIMITATIONS AND EXCLUSIONS OF CARRIERS' LIABILITY, WHICH ARE HEREBY ACCEPTED.

LIMITATION DE RESPONSABILITÉ - IMPORTANT - LISEZ S.V.P.
LE MONTANT DE TOUTE PERTE OU DOMMAGE DONT LE TRANSPORTÉUR POURRAIT ÊTRE RESPONSABLE NE DOIT PAS EXCÉDER 2.00 \$ LA LIVRE (OU 4.41 \$ LE KILOGRAMME), CALCULÉ SUR LE POIDS TOTAL DE L'EXPÉDITION, À MOINS QU'UNE VALEUR SUPÉRIEURE N'AIT ÉTÉ DÉCLARÉE SUR LE RECTO DU CONNAISSANCE PAR L'EXPÉDITEUR. LA VALEUR DÉCLARÉE MAXIMALE NE DÉPASSERA PAS 5 000 \$. N.B. VEUILLEZ PRENDRE CONNAISSANCE DES CONDITIONS AU VERSO, Y COMPRIS LES LIMITATIONS ET EXCLUSIONS DE RESPONSABILITÉ DU TRANSPORTÉUR, QUI SONT ACCEPTÉES PAR LES PRÉSENTES.

PLEASE REFER TO BILL OF LADING NUMBER FOR SHIPMENT STATUS / INQUIRIES.
POUR TOUT RENSEIGNEMENT, VEUILLEZ NOUS COMMUNIQUER LE NUMÉRO DE CONNAISSANCE.

AIRWORTHINESS REQUIREMENTS COMPLIANCE PROGRAM

APPLICANT: AERO Design Ltd.
2013 39th Avenue NE
Calgary, Alberta, T2E 6R7

DATE: 31 October, 2007
REV. No. 0

CORRESPONDANCE TO:
(If other than applicant)

MAKE: Bell Helicopter
MODEL: 206L Series, 407

REGISTRATION: All Applicable
SERIAL No.: All Applicable

NATURE OF WORK: Installation of High Side-Mounted Quick Release External Cargo Basket

MODEL CERTIFICATION BASIS: FAR 27, Amendment 27-30, with exceptions as noted below. (Bell 407, highest of 206L Series and 407)

MODIFICATION CERTIFICATION BASIS: FAR 27, Amendment 27-30, with exceptions as noted below.

Airworthiness Requirement		Subject for Compliance or Documentary Proof	Form of Substantiation	DOT	DAR	Comments
Paragraph		Amdt.				
Subpart B – Flight						
27.27	30	Centre of Gravity Limits	N/A			No change from Type Approval.
27.29	30	Empty Weight and Corresponding C of G	Data specified on inst'n drawing		X	
27.51	30	Takeoff	Flight Test	X		Flight tests performed using similar baskets of Bell 206L and 407 to satisfy the flight test requirements. Limitations established in previous flight tests to be used with this installation.
27.65	30	Climb: All Engines Operating	Flight Test	X		
27.71	30	Gliding Performance	Flight Test	X		
27.75	30	Landing	Flight Test	X		
27.141	30	Flight Characteristics – General	Flight Test	X		
27.143	30	Controllability and Maneuverability	Flight Test	X		
27.151	30	Flight controls	Flight Test	X		
27.161	30	Trim	Flight Test	X		
27.171	30	Stability – General	Flight Test	X		
27.173	1	Longitudinal Stability	Flight Test	X		
27.175	1	Demonstration of Longitudinal Stability	Flight Test	X		
27.177	30	Static Directional Stability	Flight Test	X		
27.241	30	Ground Resonance	Flight Test	X		
27.251	30	Vibration	Flight Test	X		
Subpart C – Strength Requirements						
27.301	30	Loads – Air Drag Loads	Analysis		X	
27.301	30	Loads – Inertia Loads	Compliance with 27.337 and 27.561		X	

Airworthiness Requirement	Subject for Compliance or Documentary Proof	Form of Substantiation	DOT	DAR	Comments
Paragraph	Amdt.				
27.303	30	Factor of Safety		X	
27.305	30	Strength and Deformation		X	
27.307	30	Proof of Structure		X	
27.337(a)	30	Limit Maneuvering Load Factor – Positive		X	Critical load factor in downward direction.
27.471	30	Ground Loads - General	X		External Attachment fittings already approved on STC SH00-48 are used for this installation
27.473	30	Ground Loading Conditions and Assumptions			No change to assumptions used for Type Approved configuration
27.501	30	Ground Loading Conditions – Landing Gear with Skids	X		Loads from the cargo basket on the landing gear fittings do not use skid tubes or cross tubes in load path.
27.547	30	Main Rotor Structure	X		See comments for flight test above
27.561	30	Emergency Landing Conditions		X	
27.561(b)3(i)	24	Emergency Landing Conditions – Up		X	
27.561(b)3(ii)	24	Emergency Landing Conditions – Fwd			Testing performed IAW TP766.02
27.561(b)3(iii)	24	Emergency Landing Conditions – Side		X	
27.561(b)3(iv)	24	Emergency Landing Conditions – Down		X	27.337 Maneuvering Load is Critical.

Subpart D – Design and Construction

27.601	30	Design	Drawings	X	Design is conventional.
27.603	30	Materials	Drawings	X	Materials used are specified in Mil-Hdbk-5H.
27.605	30	Fabrication Methods	Drawings	X	Design is conventional.
27.609	30	Protection of Structure	Drawings	X	
27.611	30	Inspection Provisions	Drawings	X	Design is easy to inspect.
27.613	30	Material Strength Properties and Design Values	Values used as per Mil-Hdbk-5H	X	
27.625	30	Fitting Factor	Analysis	X	
27.725	30	Limit Drop Test	N/A		Ref. TCDS Equivalent Safety Finding. Landing gear loads on fitting to be assessed by
27.727	30	Reserve Energy Absorption Drop Test	N/A		comparison with ultimate strength of original
					Type Approved fitting, and test as required.
27.783	30	Doors	N/A		Installation does not block cabin door on left side.
27.787(a)	30	Cargo and Baggage Compartments	Compliance with 23.301 through 307	X	
27.787(b)	30	Cargo and Baggage Compartments	Design	X	Basket is a closed container.
27.787(c), (d)	30	Cargo and Baggage Compartments	N/A		Cargo is external to helicopter.

Airworthiness Requirement	Subject for Compliance or Documentary Proof		Form of Substantiation	DOT	DAR	Comments
Paragraph	Amdt.					
27.807	30	Emergency Exits	Statement in report		X	Installation does not block sliding doors in outboard configuration, pop-out windows are required for inboard configuration
27.865(a)	30	External Load Attaching Means	Compliance with 27.337		X	
27.865(b), (c)	30	External Load Attaching Means	N/A			
27.865(d)	30	External Load Attaching Means	N/A			Failure of an attachment does not endanger the rotorcraft.
27.1387	30	Position Light System Dihedral Angles	N/A			No change from Type Approval.
27.1401	30	Anticollision Light System	Statement	X		Light located at FS 396, WL 130 on vertical fin. Basket has no significant effect on visibility of anticollision light.
Subpart G – Operating Limitations and Information						
27.1505	30	Never Exceed Speed	Flight Test,	X		V _{NE} limits as specified in the existing Flight Manual (140 kts.)
27.1525	30	Kinds of Operation	Flight Manual Supplement	X		Limited to VFR only.
27.1529	30	Instructions for Continuing Airworthiness	ICA Provided	X		
27.1557(a)	30	Miscellaneous Markings and Placards – Baggage Compartments	Placard		X	
27.1557(b)	30	Miscellaneous Markings and Placards	N/A			
27.1557(c)	30	Miscellaneous Markings and Placards	N/A			
27.1557(d)	30	Miscellaneous Markings and Placards	N/A			
27.1581	30	Rotorcraft Flight Manual – General	Flight Manual Supplement	X		
27.1583(c)	30	Operating Limitations – Weight and Loading Information	Flight Manual Supplement	X		
27.1585	30	Operating Procedures	Flight Manual Supplement	X		
27.1587	30	Performance Information	Flight Manual Supplement	X		
27.1589	30	Loading Information	Flight Manual Supplement & Placard	X		Placard installed on basket lid
Airworthiness Manual Requirements						
527.1581(e)		Rotorcraft Flight Manual – Units	SI and Imperial Units provided in Flight Manual Supplement	X		

FORM AE-100

DEPARTMENT OF TRANSPORT STATEMENT OF COMPLIANCE OF AIRCRAFT OR AIRCRAFT COMPONENTS WITH THE AIRWORTHINESS REQUIREMENTS			AE-100 No.: AE766-1 Initial Issue Date: 31 October, 2007 Revision: 0 Revision Date: Approval No.: SH00-48 Delegation No.: 290M Delegate Name: E. Burgoin Classification of Designee: Company: J/RO Design Ltd
Aircraft Mfg.: Bell Aircraft Model: 206L Series and 407 Registration: ALL ELIGIBLE	Model Type Airplane <input type="checkbox"/> Helicopter <input checked="" type="checkbox"/> Appliance <input type="checkbox"/> Component <input type="checkbox"/>		
LIST OF APPROVED REPORTS AND DATA			
Document Number	Revision	Document Title	Compliance Status
DCL766-1	0	Document Control List and all documents referred to therein	As per Compliance Program CP766 Revision 0
76601	0	Cargo Basket Installation	
DATA APPROVED BY TRANSPORT CANADA			
ICA766 90	0	Instructions for Continued Airworthiness	
FMS766 91	0	Flight Manual Supplement	
FMS766 92	0	Flight Manual Supplement	

CERTIFICATION

UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED NIL HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH THE PERTINENT COMPLIANCE REQUIREMENTS

I THEREFORE ☐ RECOMMEND FOR APPROVAL OF THESE DATA
☒ APPROVE THESE DATA



E. Burgoin, DAR 290M

FORM AE-100

DEPARTMENT OF TRANSPORT STATEMENT OF COMPLIANCE OF AIRCRAFT OR AIRCRAFT COMPONENTS WITH THE AIRWORTHINESS REQUIREMENTS		AE-100 No.: AE766-2 Initial Issue Date: 31 October, 2007 Revision: 0 Revision Date:
Aircraft Mfrgr: Bell Aircraft Model: 206L Series and 407 Registration: ALL ELIGIBLE	Model Type Airplane <input type="checkbox"/> Helicopter <input checked="" type="checkbox"/> Appliance <input type="checkbox"/> Component <input type="checkbox"/>	Approval No.: SH00-48 Delegation No.: 290M Delegate Name: E. Burgoin Classification of Designee: Company: AERO Design Ltd

LIST OF APPROVED REPORTS AND DATA

Document Number	Revision	Document Title	Compliance Status
DCL766-2	0	Document Control List and all documents referred to therein	As per Compliance Program,
ER766.01	0	Engineering Report	
TP766.02	0	Test Plan	CP766, Revision 0
ER606.03	0	Engineering Report – High Mounted Basket	
76610	0	Cargo Basket Assembly	
76611	0	Cargo Basket Body	
76621	0	Basket Components – End Hoop Assembly	
76622	0	Basket Components – Attachment Hoop Assembly	
76623	0	Basket Components – Hoop	
76625	0	Basket Components – Placard	
76630	0	Support Beams	
60632	0	Cargo Basket Lid	
60640	0	Basket Components – Rim	
60643	0	Basket Components – Spine	
60648	0	Basket Components – Hoop	
60649	0	Basket Components – Step Brace	
49212	0	Basket Components – Rim	
49213	1	Basket Components – Lid Brace	
49215	0	Basket Components – Lug	
49216	0	Basket Components – Lug	
36255	1	Handle Assembly	
36261	3	Handle Bar Assembly	
36262	1	Handle Bracket Assembly	
36271	1	Handle Lever	
36272	1	Basket Bracket	
36273	1	Lid Bracket	
36274	1	Bushing	
36275	2	Bushing	
36277	0	Handle Bar	
36278	2	Spring	
36280, Sheet 1	2	Brace	
36280, Sheet 2	2	Brace	

CERTIFICATION

UNDER THE AUTHORITY VESTED IN ME BY THE DEPARTMENT OF TRANSPORT, I HEREBY CERTIFY THAT THE DATA LISTED ABOVE AND ON THE ATTACHED SHEETS NUMBERED Nil HAVE BEEN EXAMINED IN ACCORDANCE WITH ESTABLISHED PROCEDURES AND FOUND TO COMPLY, TO THE BEST OF MY KNOWLEDGE AND BELIEF WITH THE PERTINENT COMPLIANCE REQUIRMENTS.

I THEREFORE ☐ RECOMMEND FOR APPROVAL OF THESE DATA
☒ APPROVE THESE DATA


 E. Burgoin, DAR 290M

APPENDIX A-3 NORMAL CATEGORY ROTORCRAFT – CAR 527

BLOCK 1

Name of the applicant for the design change approval:	Aero Design Ltd.
Description of the design change:	Installation of Quick Release Cargo Basket on Bell 206L Series and 407
Certification Basis of design change and revision date:	FAR 27, Amendment 27-30
CAR Standard A529.1(c) Program showing how changes to supplemental ICA made by the applicant or by the manufacturers of products and appliances installed in the aeroplane pursuant to the design change will be distributed:	Section 0-3 of Supplemental ICA (ICA 766.90)
CAR Standard 513.05 (1) (g) (iv): Installation Instructions:	Installation Drawing 76601

BLOCK 2

Note: Enter "N/A" when no supplemental ICA are needed.

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.2 (a) Manual(s) (a) The Instructions for Continued Airworthiness must be in the form of a manual or manuals as appropriate for the quantity of data to be provided.	ICA ref: Bell 206L and 407 Maintenance Manuals, BHT-206L-MM BHT-407-MM	Supplemental ICA ref: Single Manual (ICA766.90)
A529.2 (b) Practical arrangement (b) The format of the manual or manuals must provide for a practical arrangement.	ICA ref: Bell 206L and 407 Maintenance Manual	Supplemental ICA ref: Arranged in ATA format
A529.3 The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:		
A529.3 (a) Rotorcraft maintenance manual or section		
A529.3 (a) (1) (Introduction) (1) Introduction information that includes an explanation of the rotorcraft's features and data to the extent necessary for maintenance or preventive maintenance.	ICA ref: Bell 206L and 407 Maintenance Manual, Chapter 1	Supplemental ICA ref: Section 0-1
A529.3 (a) (2) (Description) (2) A description of the rotorcraft and its systems and installations including its engines, rotors, and appliances.	ICA ref: Bell 206L and 407 Maintenance Manual, Chapter 1	Supplemental ICA ref: Section 0-5

MSI 53 – Review of Supplemental Instructions for Continued Airworthiness

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.3 (a) (3) Control & Operation (3) Basic control and operation information describing how the rotorcraft components and systems are controlled and how they operate, including any special procedures and limitations that apply.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (a) (4) Servicing (4) Servicing information that covers details regarding servicing points, capacities of tanks, reservoirs, types of fluids to be used, pressures applicable to the various systems, location of access panels for inspection and servicing, locations of lubrication points, lubricants to be used, equipment required for servicing, tow instructions and limitations, mooring, jacking, and levelling information.	ICA ref: Bell 206L and 407 Maintenance Manual, Chapter 12	Supplemental ICA ref: N/A
A529.3 The Instructions for Continued Airworthiness must contain the following manuals or sections, as appropriate, and information:		
A529.3 (b) Maintenance Instructions.		
A529.3 (b) (1) Scheduling 1) Scheduling information for each part of the rotorcraft and its engines, auxiliary power units, rotors, accessories, instruments, and equipment that provides the recommended periods at which they should be cleaned, inspected, adjusted, tested, and lubricated, and the degree of inspection, the applicable wear tolerances, and work recommended at these periods. However, the applicant may refer to an accessory, instrument, or equipment manufacturer as the source of this information if the applicant shows that the item has an exceptionally high degree of complexity requiring specialized maintenance techniques, test equipment, or expertise. The recommended overhaul periods and necessary cross-references to the Airworthiness Limitations section of the manual must also be included. In addition, the applicant must include an inspection program that includes the frequency and extent of the inspections necessary to provide for the continued airworthiness of the rotorcraft.	ICA ref: Bell 206L and 407 Maintenance Manual, Chapter 5	Supplemental ICA ref: Section 5-1
A529.3 (b) (2) Troubleshooting (2) Troubleshooting information describing probable malfunctions, how to recognize those malfunctions, and the remedial action for those malfunctions.	ICA ref: N/A	Supplemental ICA ref: N/A

MSI 53 – Review of Supplemental Instructions for Continued Airworthiness

Regulatory Standard Reference Column 1	Design Approval Holder (DAH) ICA Reference Column 2	Applicant Means of Compliance Supplemental ICA Requirements Column 3
A529.3 (b) (3) Removal/replacement (3) Information describing the order and method of removing and replacing products and parts with any necessary precautions to be taken.	ICA ref: Bell 206L and 407 Maintenance Manual, Chapter 25	Supplemental ICA ref: Section 25-1 thru 25-4
A529.3 (b) (4) General (4) Other general procedural instructions including procedures for system testing during ground running, symmetry checks, weighing and determining the center of gravity, lifting and shoring, and storage limitations.	ICA ref: Bell 206L and 407 Maintenance Manual, Chapter 7 and 8	Supplemental ICA ref: Section 25-5
A529.3 (c) Access (c) Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided.	ICA ref: N/A	Supplemental ICA ref: N/A
A529.3 (d) Special inspections (d) Details for the application of special inspection techniques including radiographic and ultrasonic testing where such processes are specified.	ICA ref: Bell 206L and 407 Maintenance Manual, Chapter 5	Supplemental ICA ref: Section 5-1
A529.3 (e) Protective treatment (e) Information needed to apply protective treatments to the structure after inspection.	ICA ref: Bell Standard Practices Manual BHT-ALL-SPM, Chapter 3	Supplemental ICA ref: Section 5-3
A529.3 (f) Fasteners, torque values, etc (f) All data relative to structural fasteners such as identification, discard recommendations, and torque values.	ICA ref: Bell Standard Practices Manual BHT-ALL-SPM, Chapter 2	Supplemental ICA ref: Section 25-6
A529.3 (g) Special tools (g) A list of special tools needed.	ICA ref: N/A	Supplemental ICA ref: N/A

BLOCK 3

Note: The statement in block 5 does not constitute an approval of the Airworthiness Limitations Section. Airworthiness Limitations differ from other maintenance tasks, in that they are mandatory, as a direct condition of the approval of the type design. They are therefore referenced directly in the approval document itself. However, they must also be included in the Supplemental Instructions for Continued Airworthiness.

MSI 53 – Review of Supplemental Instructions for Continued Airworthiness

A529.4 AWL - Separate Section 1

The Instructions for Continued Airworthiness must contain a section titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure approved under 529.571. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads: "The Airworthiness Limitations section is approved by the Minister and specifies maintenance required by any applicable airworthiness or operating rule unless an alternative program has been approved by the Minister."

ICA ref: Bell 206L and 407
Maintenance Manual, Chapter 4

Supplemental ICA ref: Chapter 4

BLOCK 4 – Applicant Statement of Compliance

The Supplemental ICA referenced above comprises the complete listing of supplemental ICA necessary to show compliance with the regulatory standard that supports this change in type design.

Applicants Signature: _____

Date: _____

Applicants Name: E. Burgoin, P.Eng, DAR 290M

BLOCK 5 – Minister's Statement of Acceptability

The design change is adequately supported by existing ICA and/or supplemental ICA, as identified above and is acceptable to the Minister.

Reviewer's Name: _____ Phone # _____ Email: _____ Mail Routing Symbol: _____

Signature: _____ Date: _____ NAPA Number _____

AERO Design Ltd.

**ENGINEERING REPORT
ER766.01**

**QUICK RELEASE HIGH MOUNTED
CARGO BASKET**

Bell 206L Series and 407

Approved: E. Burgoin, P. Eng.

Prepared by: Jeff Clarke

Revision 0
Date: 25 September, 2007

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Engineering Consultants

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1.0 INTRODUCTION

For heli-ski operations, a longer cargo basket is required to accommodate skis. Also, it is preferred that the basket is mounted above the bottom of the fuselage, because when the helicopter lands in loose powder snow, it will sink into the snow until the skid gear touches the ground or the bottom of the fuselage settles into the snow. If the basket is mounted low it will settle on the snow first, causing the helicopter to roll to the side.

This installation is intended to replace the high mounted configuration that is already on STC SH00-48.

The quick release mechanism is built into new steel beams. The mounting points on the basket are changed to include a seat track fitting that engages in a keyway on the top surface of the beams. Provisions are also provided to mount a fixed low mounted cargo basket when the high mounted basket is removed.

2.0 REFERENCE

AERO Design Ltd. Engineering Reports ER606.03

AERO Design Ltd. Drawing 76601

AERO Design Ltd. Test Plan TP766.02

3.0 BASIS OF CERTIFICATION

Bell 407, TCDS H-92 (Highest of Bell 206L series and 407):

FAR part 27, dated October 2, 1964 Amendment 27-1 through 27-30; Paragraph 27.561(b)(3) at Amdt 27-24; Section 27.563 at Amdt. 27-25; Section 27.785 at Amdt 27-24; Section 27.1093 at amendment 27-8; and Section 27.173 and 27.175 at amendment 27-1.

Exemptions to FAR 27 are the deletion of sections: 27.562, 27.1195, and 27.952(b)(1).

This installation:

Same as the basis of certification for the Bell 407 as shown on Type Certificate Data Sheet H-92.

Clarification was requested on the interpretation of FAR 27.787(b)(2) as it applies to FAR 27.561. Ruling from Transport Canada in e-mail dated 19 November, 2004, provides that the ultimate forward emergency landing load factor is 4g. See appendix A of ER606.03.

4.0 ANALYSIS OF CURRENT AIRWORTHINESS DIRECTIVES (AD'S)

There are no current AD's related to this installation.

5.0 LOADS

BELL 407 HELICOPTER LOAD FACTORS, FAR 27:

FAR 27.561(c), amendment 27-24

	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} = 1.5$
	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} = 4.0$
	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} = 2.0$
	Ultimate Downward Emergency Landing Load Factor:	$n_{e_down} = 4.0$
FAR 27.625	Fitting Factor:	$n_{ff} = 1.15$
FAR 27.303	Safety Factor:	$n_{sf} = 1.5$
FAR 27.337(a)	Limit Positive Maneuvering LoadFactor:	$n_{man} = 3.5$
$n_{man_ult} = n_{man} \cdot n_{sf}$	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
	Limit Negative Maneuvering LoadFactor:	$n_{man_n} = -1.0$
$n_{man_neg_u} = n_{man_n} \cdot n_{sf}$	Ultimate Negative Maneuvering LoadFactor:	$n_{man_neg_u} = -1.5$

CRITICAL ULTIMATE LOAD FACTORS:

Downward:	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
Forward:	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} = 4.00$
Sideward:	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} = 2.00$
Upward:	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} = 1.50$

Sideward and Upward deflection or failure of the basket in the emergency landing condition do not endanger the occupants. Sideward and Upward Load Factors are used in the tests to ensure that the lid of the basket does not open in flight.

DRAG LOAD ON BASKET

	Length of basket.	$l_{\text{basket}} = 96.5 \text{ in}$
	Width of basket.	$w_{\text{basket}} = 22 \text{ in}$
	Height of basket.	$h_{\text{basket}} = 17 \text{ in}$
	Frontal Area of basket.	$A_f = 352 \text{ in}^2$
$A_p = l_{\text{basket}} \cdot w_{\text{basket}}$	Planar Area of basket.	$A_p = 2123 \text{ in}^2$
	Fineness ratio of basket	$\frac{l_{\text{basket}}}{w_{\text{basket}}} = 4.4$
	Drag Coefficient of Basket, (overestimated) (Ref. Hoerner, Fluid Dynamic Drag, Chapter 3, Figure 22).	$C_{Do} = 1.5$
	Density of air at Sea Level.	$\rho = 0.002378 \frac{\text{slug}}{\text{ft}^3}$
	Never-Exceed-Speed of 407. (Ref. 407 Flight Manual.)	$V_{ne} = 140 \text{ knots}$
$V_d = \frac{V_{ne}}{0.9}$	Dive Speed of Bell 407	$V_d = 156 \text{ knots}$
$\text{Drag} = \frac{\rho}{2} \cdot V_d^2 \cdot A_f \cdot C_{Do}$	Limit drag on basket.	$\text{Drag} = 301 \text{ lbf}$
$P_{\text{drag_ult_test}} = \text{Drag} \cdot n_{sf}$	Ultimate applied drag load on basket if compliance shown by test	$P_{\text{drag_ult_test}} = 451 \text{ lbf}$
$P_{\text{drag_ult}} = \text{Drag} \cdot n_{sf} \cdot n_{ff}$	Ultimate applied drag load on basket if compliance shown by analysis	$P_{\text{drag_ult}} = 518 \text{ lbf}$
	Lateral Aerodynamic Center of basket.	$AC_{\text{drag}} = 46.75 \text{ in}$

LOADS ON BASKET

Weight of basket.	$W_{\text{basket}} := 55.5 \text{ lbf}$
Cargo Capacity of basket.	$W_{\text{cargo}} := 200 \text{ lbf}$
Fitting Factor (Not required where compliance is shown by test)	$n_{\text{ff}} = 1.15$

DOWNWARD:

The basket shall support its contents under the maximum maneuvering load factor.

	Limit Positive Maneuvering Load Factor:	$n_{\text{man}} = 3.5$
$p_{z_lim} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{\text{man}}$	Limit Vertical Load on basket.	$p_{z_lim} = 894 \text{ lbf}$
	Ultimate Positive Maneuvering Load Factor:	$n_{\text{man_ult}} = 5.25$
$p_{z_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{\text{man_ult}}$	Ultimate Vertical Load on basket.	$p_{z_ult} = 1341 \text{ lbf}$

FORWARD:

Deflection of the basket, or shifting of its contents in the forward direction in an emergency landing does not endanger the occupants of the helicopter. However, forward deflection of the basket could block the pilot's door, so the forward load is required.

	Ultimate Forward Emergency Load Factor:	$n_{e_fwd} = 4.00$
$p_{fwd_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{e_fwd}$	Ultimate forward load on basket	$p_{fwd_ult} = 1022 \text{ lbf}$

SIDEWARD:

Deflection of the basket, or shifting of its contents in the sideward direction in an emergency landing does not endanger the occupants of the helicopter. However, to ensure that the lid of the basket cannot open during flight, the ultimate sideward load factor will be used. The handle latches the lid closed, and is retained by a torsion spring.

Ultimate Sideward Emergency Load Factor:	$n_{e_side} = 2.00$
--	----------------------

The handle must stay closed when pulled sideways with twice its weight.

UPWARD:

For attachment of the basket to the helicopter, the critical vertical load is downward, but this load factor will be used to ensure that the lid cannot open during flight or an emergency landing.

	Ultimate Upward Emergency Load Factor:	$n_{e_up} = 1.50$
$p_{z_lid} := W_{\text{cargo}} \cdot n_{e_up}$	Ultimate Upward Load of cargo on lid.	$p_{z_lid} = 300 \text{ lbf}$

6.0 STRUCTURAL COMPLIANCE

6.1 Basket Assembly

This basket is of the same construction as the existing high cargo baskets previously substantiated in ER606.03 and approved. The only change is to the attachment to the beams. A basket assembly was used for testing (see below), so compliance with the critical maneuvering/drag and forward loads on the basket is demonstrated.

6.2 Basket Attachment

The basket is attached to the beams with two lugs per beam. The lugs are welded into the hoops and have an Ancra part 40088-14 fitting installed. The fittings were installed on the basket tested (see below).

6.3 Beams

The basket is mounted further outboard than on any previous installation, so the beams must be able to withstand the increased bending moment. The basket must not block the pilot's door after application of the forward emergency landing load condition (FAR 27.561).

6.4 Attachment Fittings

The aft fittings are critical because they are closer together than the forward fittings.

Basic reactions on the fittings:

Maneuvering condition

$$P_{ult_man_beam} = \frac{W_{basket} + W_{cargo}}{2} \cdot n_{man_ult} \cdot n_{ff}$$

Ultimate maneuvering load on beam

$$P_{ult_man_beam} = 785 \cdot lbf$$

Summing moments about A = 0 :

$$R_{B_vert} = \frac{P_{ult_man_beam} \cdot 36.5 \text{ in}}{20.5 \text{ in}}$$

Vertical reaction on B

$$R_{B_vert} = 1397 \cdot lbf$$

Summing forces vertically:

$$R_{A_vert} = P_{ult_man_beam} + R_{B_vert}$$

Vertical reaction on A

$$R_{A_vert} = 2182 \cdot lbf$$

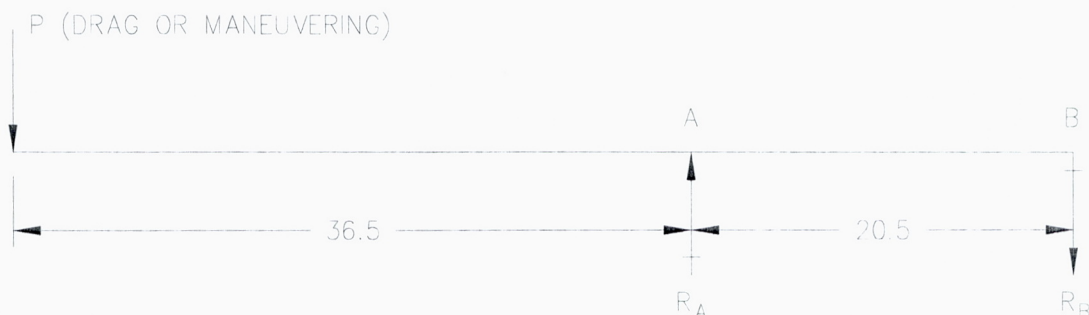


Figure 3 – Free Body Diagram of Loads on Aft Attachments
(Drag or Maneuvering)

Drag condition

Ultimate drag on basket

$$P_{\text{drag_ult}} = 518 \cdot \text{lbf}$$

$$P_{\text{ult_drag_beam}} = \frac{P_{\text{drag_ult}}}{2}$$

Ultimate drag on each beam

$$P_{\text{ult_drag_beam}} = 259 \cdot \text{lbf}$$

Summing moments about A = 0 :

$$R_{B_horiz} = \frac{P_{\text{ult_drag_beam}} \cdot 36.5 \text{ in}}{20.5 \text{ in}}$$

Horizontal reaction on B

$$R_{B_horiz} = 462 \cdot \text{lbf}$$

Summing forces horizontally:

$$R_{A_horiz} = P_{\text{ult_drag_beam}} + R_{B_horiz}$$

Horizontal reaction on A

$$R_{A_horiz} = 721 \cdot \text{lbf}$$

Reactions at A are critical

Vertical reaction on A

$$R_{A_vert} = 2182 \cdot \text{lbf}$$

Horizontal reaction on A

$$R_{A_horiz} = 721 \cdot \text{lbf}$$

Using the limitations specified in Appendix A of ER493.01:

Ultimate allowable vertical load on attachment

$$P_{\text{ult_vert}} = 3413 \cdot \text{lbf}$$

Ultimate fore/aft load on attachment

$$P_{\text{ult_fwd_aft}} = 2600 \cdot \text{lbf}$$

This installation is within the limits specified.

MARGIN OF SAFETY IS POSITIVE

6.5 Load Tests

Load testing is performed in accordance with Transport Canada accept Test Plan TP766.02. Testing was witnessed by Greg Oucharek, Transport Canada Aircraft Certification, on October 12, 2007.

6.5.1 Ultimate Forward Load

Ultimate forward load: 1022 lbs

The basket was pulled forward 1040 lbs. When the load was removed, the basket and beams were checked for permanent deformation.

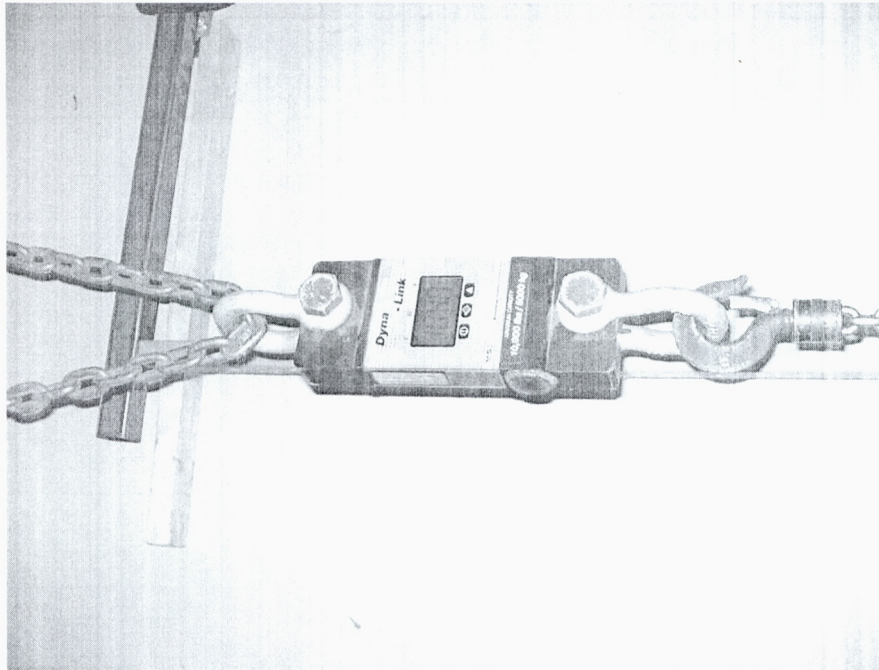


Figure 6.5.1 – Ultimate Forward Load (1040 lbs)

There was slight permanent deformation noted in the beams after removal of the ultimate forward load, less than $\frac{1}{4}$ " at the outboard end of the beam. There is no danger of obstructing the pilots door if the permanent deformation does not exceed 1" after application of the ultimate forward load. The basket, its attachments, and the beams are acceptable for installation.

6.5.2 Combined Limit Maneuvering/Drag Loads

Limit Loads:

Limit maneuvering load = 894 lbs

Limit drag load = 301 lbs

The basket applies 1g down. Only the basket body is used, which weighs 31.5 lbs

Applied Maneuvering Load = $894 - 31.5 = 862.5$ lbs

The lead shot is in 25 lb bags, 875 lbs is required (35 bags @ 25 lbs/bag)

The basket was loaded with 875 lbs of lead shot (maneuvering load), and pulled 350 lbs (drag). The loads were then removed and the basket and beams checked for permanent deformation.

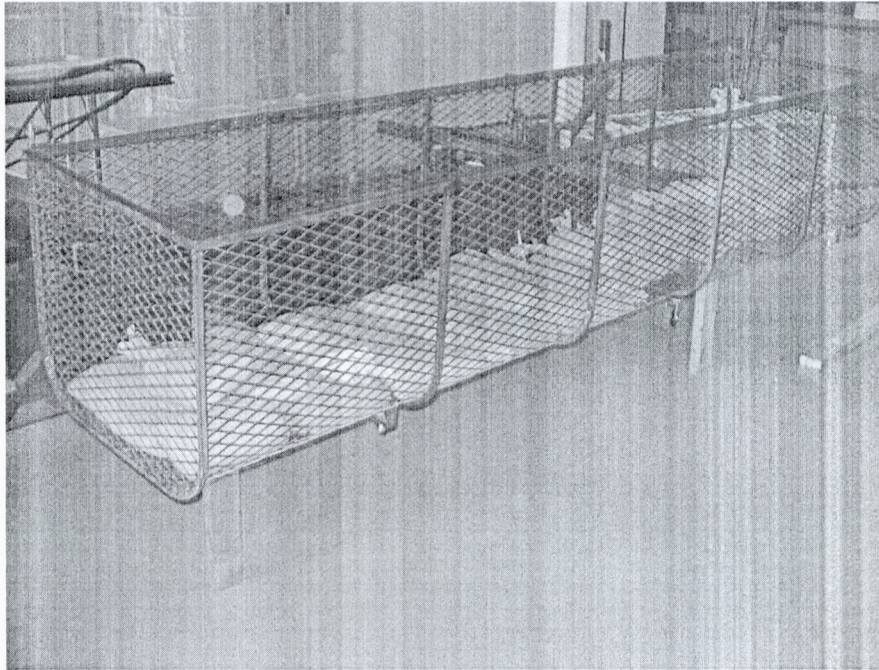


Figure 6.5.2 – Maneuvering Load Application

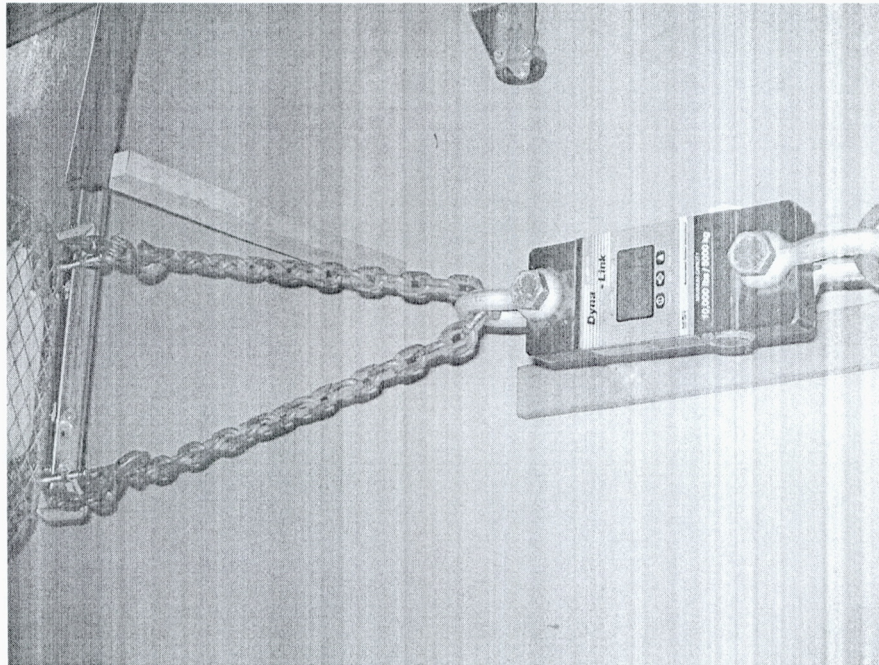


Figure 6.5.3 – Drag Load (350 lbs)

There was no permanent deformation found after the load was removed.

6.5.3 Combined Ultimate Maneuvering/Drag Loads

Ultimate Loads:

Ultimate maneuvering load = 1341 lbs

Ultimate drag load = 451 lbs

The basket applies 1g down. Only the basket body is used, which weighs 31.5 lbs

Applied Maneuvering Load = $1341 - 31.5 = 1309.5$ lbs

The lead shot is in 25 lb bags, 1325 lbs is required (53 bags @ 25 lbs/bag).

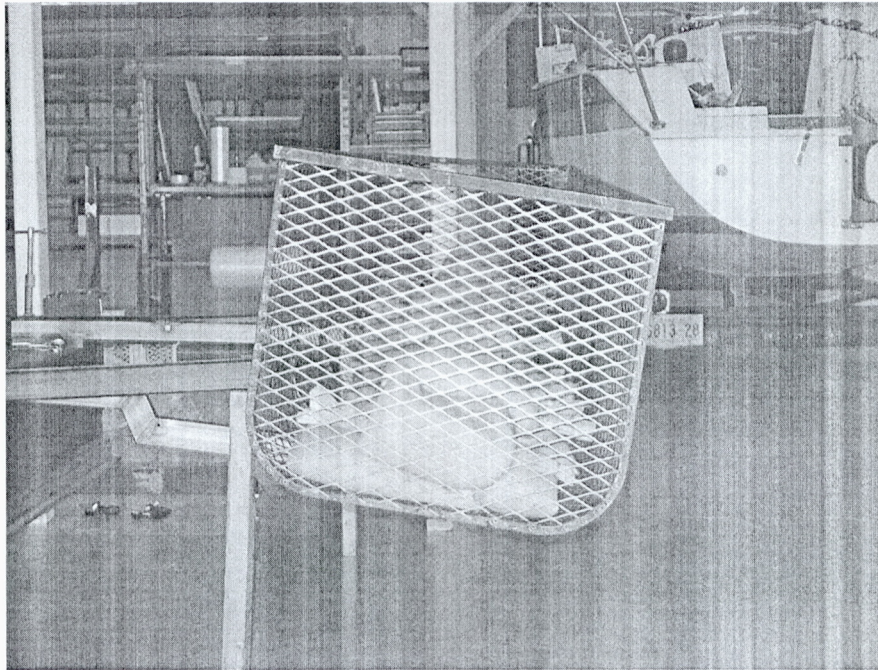


Figure 6.5.4 – Ultimate Maneuvering Load

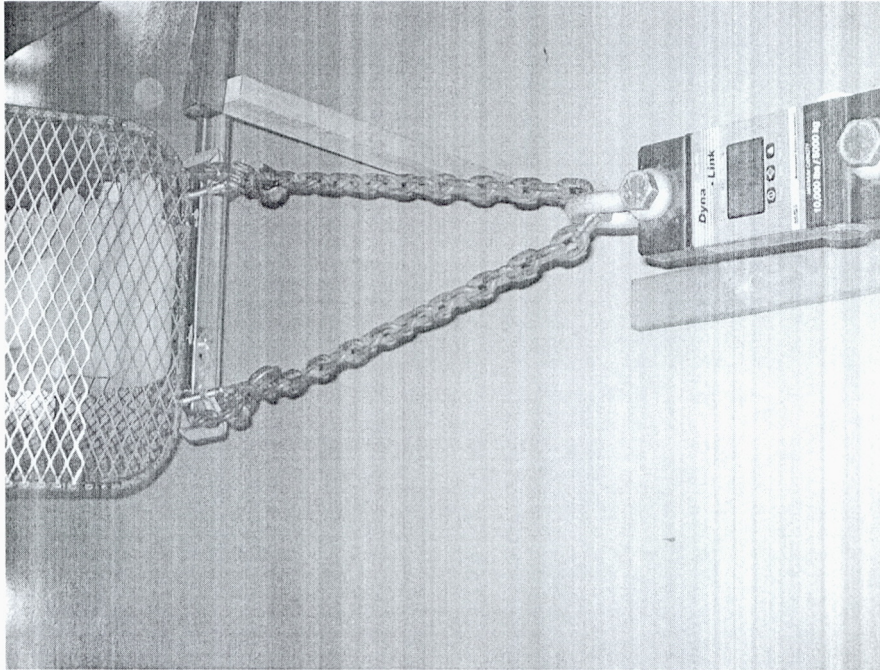


Figure 6.5.5 – Ultimate Drag Load (490 lbs)

After the ultimate loads were removed the basket and beams were checked for permanent deformation or failures. There was significant deformation of the aft beam, but it did not fail. There was slight deformation of the forward beam.

The basket assembly and beams are acceptable.

7.0 COMPLIANCE WITH FAR 27.807 – EMERGENCY EXITS

FAR 27.807(b)(1) states that an emergency exit must allow a 19 inch by 26 inch ellipse to pass un-obstructed. See figure 7.0.1.

Installation drawing 76601 requires either an approved emergency “pop-out” window in the passenger door or an approved sliding passenger door.

The cargo basket is positioned laterally to provide clearance for the sliding door to open – 6.0 inches outboard of the widest point of the helicopter on the Bell 407, 9.5 inches on the 206L. This distance provides significant clearance with the “pop-out” windows. See figure 7.0.2.

Clearance from the pilot's door has been demonstrated in section 6.5.2 after application of ultimate forward emergency landing load factors to the basket installation.

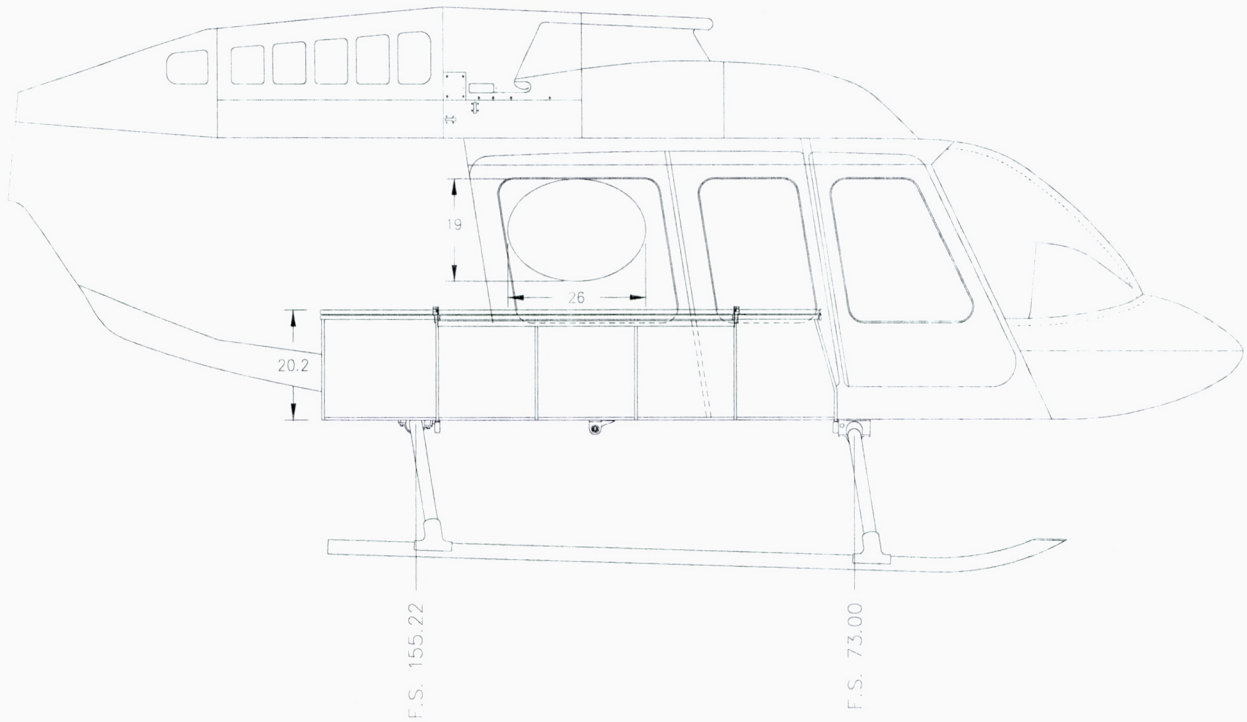


Figure 7.0.1 – Side View of Installation

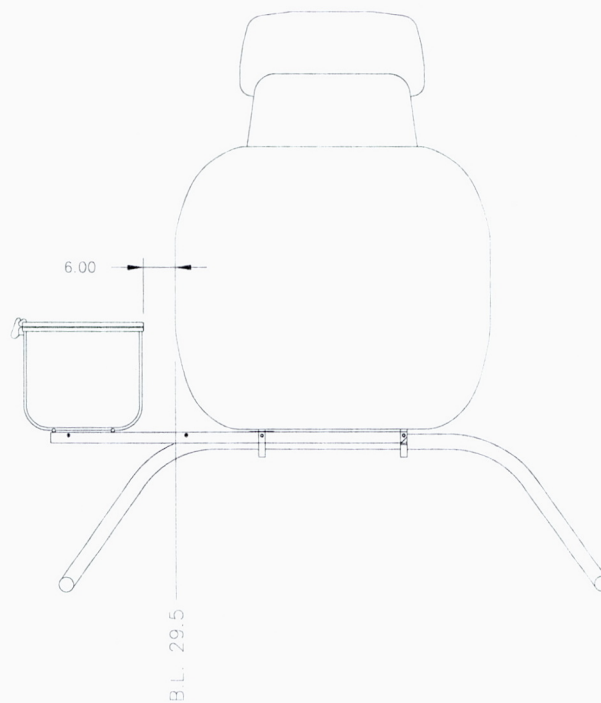


Figure 7.0.2 – Front View of Installation

APPENDIX A

EMAIL FROM TRANSPORT CANADA

From: Staal, Jack
Sent: Friday, November 19, 2004 3:28 PM
To: "Aerodesign (E-Mail)" <aerodesign@telusplanet.net>
Subject: FW: 407 Heli-Ski Basket changes

Ted,

4g forward would be accepted in this case..

Thanks

J.H. (Jack) Staal

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Edmonton, AB T5J 4E6
Government of Canada | Gouvernement du Canada

AERO Design Ltd.

STRUCTURAL TEST PLAN
TP766.02

HIGH MOUNTED QUICK RELEASE CARGO BASKET

Bell 206L Series & 407

Revision 0
Date: 26 September, 2007

AERO Design Ltd.
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1.0 INTRODUCTION

Aero Design Ltd. is the holder of STC SH00-48 which provides for the installation of a cargo basket on the right hand side of Bell 206 L series and Bell 407 helicopters. One configuration installs the basket to the right side of the passenger cabin door. The basket is supported by aluminum beams bolted to the front and aft end of the baskets that are attached to modified landing gear attachment fittings.

It has become a desirable feature to be able to quickly remove the basket from the helicopter for both ground handling and flight operations that does not require the use of tools.

A new design for attaching the cargo basket to the support beams has been implemented that allows for quick installation and detachment without the use of tools. The aluminum beam construction has also been replaced and new beams built from 2" x 1" rectangular tubing is used.

The landing gear attachment fittings to which the basket support beams are secured are approved in STC SH00-48 and remain unaltered physically, allowable loads or the loads which are applied to them by this installation.

The cargo basket assembly is approved in STC SH00-48 and remains unchanged except for its attachment to the support beams.

The purpose of this test is to demonstrate compliance with the structural requirements FAR 27.303, 27.305, 27.307, and 27.561 to support combined drag loads at Vd (FAR 27.301(b)) and the maneuvering load conditions (FAR 27.337), and emergency forward landing conditions (FAR 29.561) with the new support beams installed.

2.0 REFERENCE

AERO Design Ltd. drawing 49222 – Forward and Aft Support Beams

AERO Design Ltd. drawing 76610 – Cargo Basket Assembly

3.0 BASIS OF CERTIFICATION

Bell 407, TCDS H-92 (Highest of Bell 206L series and 407):

FAR part 27, dated October 2, 1964 Amendment 27-1 through 27-30; Paragraph 27.561(b)(3) at Amdt 27-24; Section 27.563 at Amdt. 27-25; Section 27.785 at Amdt 27-24; Section 27.1093 at amendment 27-8; and Section 27.173 and 27.175 at amendment 27-1.

Exemptions to FAR 27 are the deletion of sections: 27.562, 27.1195, and 27.952(b)(1).

This installation:

Same as the basis of certification as shown the Type Certificate Data Sheet.

4.0 ANALYSIS OF CURRENT AIRWORTHINESS DIRECTIVES (AD'S)

AD CF-2004-03 relates to high stresses imposed on the landing gear cross tubes during run on landings, and introduces an RIN (Retirement Index Number) on the landing gear cross tubes. This installation does not affect compliance with AD CF-2004-03.

Two AD's requiring a lower V_{NE} have been issued (CF-1998-36, CF-2001-01). CF-2001-01 has been rescinded. CF-1998-36 is still in effect. This installation does not affect compliance with AD CF-1998-36, as the flight manual supplement states that if the V_{NE} of the existing flight manual is more restrictive to use the lower value.

5.0 LOADS

BELL 407 HELICOPTER LOAD FACTORS, FAR 27:

FAR 27.561(c), amendment 27-24

	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} = 1.5$
	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} = 4.0$
	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} = 2.0$
	Ultimate Downward Emergency Landing Load Factor:	$n_{e_down} = 4.0$
FAR 27.625	Fitting Factor:	$n_{ff} = 1.15$
FAR 27.303	Safety Factor:	$n_{sf} = 1.5$
FAR 27.337(a)	Limit Positive Maneuvering LoadFactor:	$n_{man} = 3.5$
$n_{man_ult} = n_{man} \cdot n_{sf}$	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
	Limit Negative Maneuvering LoadFactor:	$n_{man_n} = -1.0$
$n_{man_neg_u} = n_{man_n} \cdot n_{sf}$	Ultimate Negative Maneuvering LoadFactor:	$n_{man_neg_u} = -1.5$

CRITICAL ULTIMATE LOAD FACTORS:

Downward:	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
Forward:	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} = 4.00$
Sideward:	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} = 2.00$
Upward:	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} = 1.50$

Sideward and Upward deflection or failure of the basket in the emergency landing condition do not endanger the occupants. Sideward and Upward Load Factors are used in the tests to ensure that the lid of the basket does not open in flight.

LOADS ON BASKET

Weight of basket.	$W_{\text{basket}} := 55.5 \text{ lbf}$
Cargo Capacity of basket.	$W_{\text{cargo}} := 200 \text{ lbf}$
Fitting Factor (Not required where compliance is shown by test)	$n_{\text{ff}} = 1.15$

DOWNWARD:

The basket shall support its contents under the maximum maneuvering load factor.

	Limit Positive Maneuvering Load Factor:	$n_{\text{man}} = 3.5$
$P_{Z_lim} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{\text{man}}$	Limit Vertical Load on basket.	$P_{Z_lim} = 894 \text{ lbf}$
	Ultimate Positive Maneuvering Load Factor:	$n_{\text{man_ult}} = 5.25$
$P_{Z_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{\text{man_ult}}$	Ultimate Vertical Load on basket.	$P_{Z_ult} = 1341 \text{ lbf}$

FORWARD:

Deflection of the basket, or shifting of its contents in the forward direction in an emergency landing does not endanger the occupants of the helicopter. However, forward deflection of the basket could block the pilot's door, so the forward load is required.

	Ultimate Forward Emergency Load Factor:	$n_{e_fwd} = 4.00$
$P_{fwd_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{e_fwd}$	Ultimate forward load on basket	$P_{fwd_ult} = 1022 \text{ lbf}$

SIDEWARD:

Deflection of the basket, or shifting of its contents in the sideward direction in an emergency landing does not endanger the occupants of the helicopter. However, to ensure that the lid of the basket cannot open during flight, the ultimate sideward load factor will be used. The handle latches the lid closed, and is retained by a torsion spring.

Ultimate Sideward Emergency Load Factor:	$n_{e_side} = 2.00$
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The handle must stay closed when pulled sideways with twice its weight.

UPWARD:

For attachment of the basket to the helicopter, the critical vertical load is downward, but this load factor will be used to ensure that the lid cannot open during flight or an emergency landing.

	Ultimate Upward Emergency Load Factor:	$n_{e_up} = 1.50$
$P_{Z_lid} := W_{\text{cargo}} \cdot n_{e_up}$	Ultimate Upward Load of cargo on lid.	$P_{Z_lid} = 300 \text{ lbf}$

DRAG LOAD ON BASKET

	Length of basket.	$l_{\text{basket}} = 96.5 \text{ in}$
	Width of basket.	$w_{\text{basket}} = 22 \text{ in}$
	Height of basket.	$h_{\text{basket}} = 17 \text{ in}$
	Frontal Area of basket.	$A_f = 352 \text{ in}^2$
$A_p = l_{\text{basket}} \cdot w_{\text{basket}}$	Planar Area of basket.	$A_p = 2123 \text{ in}^2$
	Fineness ratio of basket	$\frac{l_{\text{basket}}}{w_{\text{basket}}} = 4.4$
	Drag Coefficient of Basket, (overestimated) (Ref. Hoerner, Fluid Dynamic Drag, Chapter 3, Figure 22).	$C_{Do} = 1.5$
	Density of air at Sea Level.	$\rho = 0.002378 \frac{\text{slug}}{\text{ft}^3}$
	Never-Exceed-Speed of 407. (Ref. 407 Flight Manual.)	$V_{ne} = 140 \text{ knots}$
$V_d = \frac{V_{ne}}{0.9}$	Dive Speed of Bell 407	$V_d = 156 \text{ knots}$
$\text{Drag} = \frac{\rho}{2} \cdot V_d^2 \cdot A_f \cdot C_{Do}$	Limit drag on basket.	$\text{Drag} = 301 \text{ lbf}$
$P_{\text{drag_ult_test}} = \text{Drag} \cdot n_{sf}$	Ultimate applied drag load on basket if compliance shown by test	$P_{\text{drag_ult_test}} = 451 \text{ lbf}$
$P_{\text{drag_ult}} = \text{Drag} \cdot n_{sf} \cdot n_{ff}$	Ultimate applied drag load on basket if compliance shown by analysis	$P_{\text{drag_ult}} = 518 \text{ lbf}$
	Lateral Aerodynamic Center of basket.	$AC_{\text{drag}} = 46.75 \text{ in}$

6.0 STRUCTURAL COMPLIANCE

6.1 Beams

Strength of the beams and the attachment of the basket to the beams is demonstrated by test. The aft beam is critical since the positioning of the left and right landing gear attachment fittings are closer together for the aft l/g cross-tube than the forward l/g cross-tube.

6.1.1 Test Setup

A jig was fabricated to simulate the helicopter attachments. Two large steel tubes were drilled to match the actual mounting positions of the front and rear attachments, and were then welded to a large I beam.

Forward and aft beams were fabricated in accordance with drawing 49222, Revision 2. The beams are installed on the jig fabricated above, using AN6 bolts as they would be installed on the helicopter.

A basket (without lid) was fabricated in accordance with drawing 76611. The basket is installed on the beams in the outboard position (critical position).

The drag and forward load is applied by pulling on the front face of the basket with a chain, using a come-along attached to a load cell. The maneuvering load is applied by stacking bags of lead shot inside the basket, evenly distributed front to back.

The test setup is shown in the following pictures.

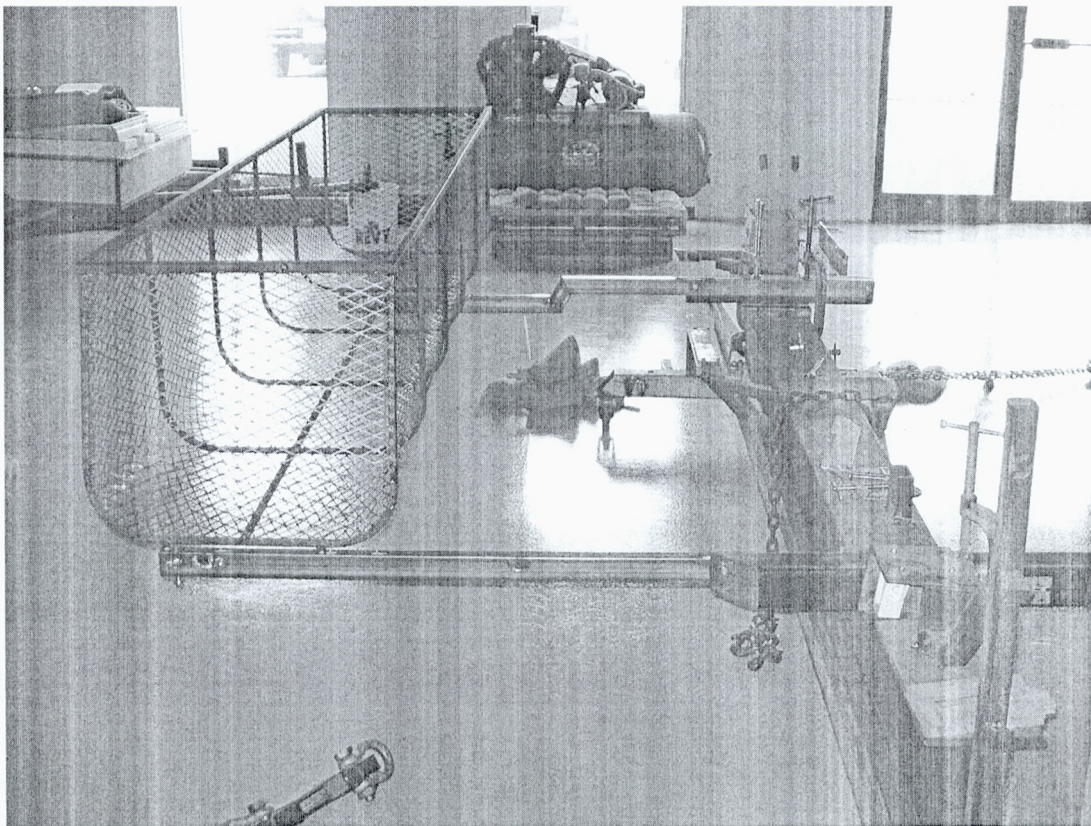


Figure 1 - Complete Test Setup, looking aft as installed



Figure 2 - Complete Test Setup, looking outboard



Figure 3 - Beam Attachment, Forward

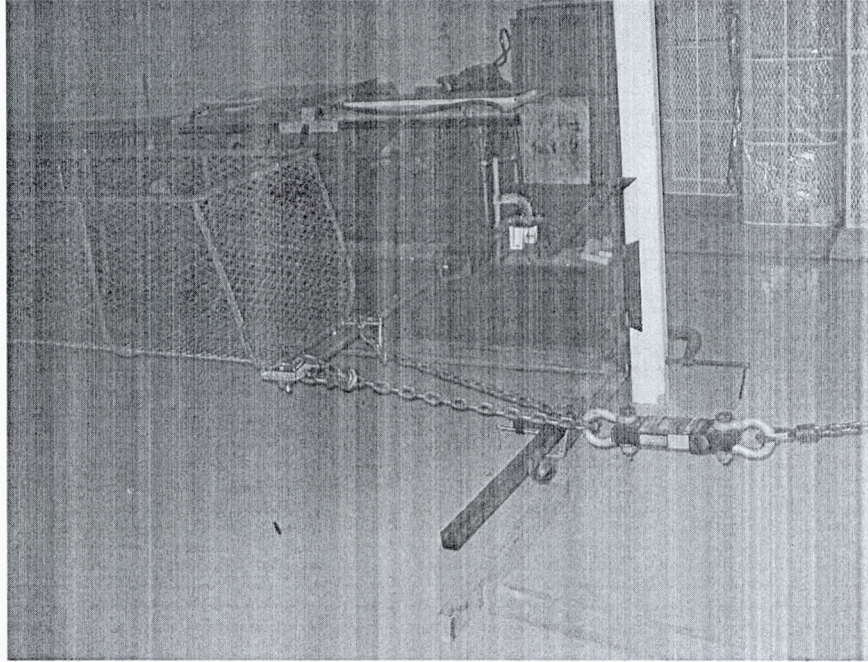


Figure 4 - Drag Load Application

6.1.2 Test – Forward

Ultimate forward load is applied separately from other loads.

Ultimate forward load = 1022 lbs

The ultimate forward load test must demonstrate that there is not more than 1" of permanent forward deflection after the load is removed. This is to ensure the pilot's door is not blocked after the emergency landing condition has been experienced.

6.1.3 Test – Limit Maneuvering and Drag

Limit maneuvering and drag loads are applied simultaneously.

Required loads:

Maneuvering load = 894 lbs

Drag load = 301 lbs

The basket applies 1g down. Only the basket body is used, which weighs 31.5 lbs

Applied Maneuvering Load = $894 - 31.5 = 862.5$ lbs

The lead shot is in 25 lb bags, 875 lbs is required (35 bags)

After application of the load for at least 3 seconds, the loads are to be removed and the structure inspected for signs of permanent deformation.

6.1.4 Test – Ultimate Maneuvering and Drag

Ultimate maneuvering and drag loads are applied simultaneously.

Required loads:

Maneuvering load = 1341 lbs

Drag load = 451 lbs

The basket applies 1g down. Only the basket body is used, which weighs 31.5 lbs

Applied Maneuvering Load = $1341 - 31.5 = 1309.5$ lbs

The lead shot is in 25 lb bags, 1325 lbs is required (53 bags).

Ultimate loads are to be applied for a minimum of three seconds without structural failure.

BELL 407

ROTORCRAFT FLIGHT MANUAL SUPPLEMENT for the INSTALLATION of the AERO DESIGN HIGH MOUNTED QUICK RELEASE CARGO BASKET

Supplemental Type Certificate No. SH00-48

Sections I, II, III and IV of this document comprise the Transport Canada Approved sections of this Flight Manual Supplement. Compliance with Section I, Limitations, is mandatory.

Section V and any subsequent sections if present are Unapproved and are provided for information only.

The information and data contained in this Flight Manual Supplement supersede or supplement that contained in the basic Approved Flight Manual for the Bell 407 when fitted with the Cargo Basket Installation. For limitations, procedures and performance not listed in this Flight Manual Supplement, refer to the Approved Flight Manual and other approved Flight Manual Supplements.

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Record of Revisions

Revision	Issue Date	Pages Revised	Date Inserted	By

I LIMITATIONS

1. The maximum load in the AERO Design Ltd. Cargo Basket is 200 Lb. (90.9 kg).
2. Flight operations limited to VFR conditions with AERO Design Ltd. Cargo Basket installed.
3. Maximum lateral or rearward speed limited to 25 KIAS.
4. Maximum winds from aft quadrants limited to 25 KIAS for takeoff, landing or hover flight.
5. V_{NE} is 140 KIAS except when the V_{NE} of the basic rotorcraft is more restrictive, in which case the lower V_{NE} applies.
6. No occupants in the passenger cabin unless helicopter is equipped with approved push out emergency windows or sliding door on the basket side of the helicopter.

II NORMAL PROCEDURES

1. Pre-flight inspections:
 - a) Ensure basket is located in correct lateral keyway for the configuration of the helicopter (see section VI):

If a right hand sliding door is installed the basket MUST be positioned in the most outboard lateral position to provide clearance for the door to open.

If a pop-out window is installed on the helicopter, the basket may be installed in either position, but the preferred position is inboard for a more favorable lateral C of G.
 - b) Ensure that all cargo stored in the cargo basket does not extend outside the basket, is properly tied down and secured for flight.
 - c) Ensure that the lid of cargo basket is closed and secured.

III EMERGENCY PROCEDURES

No change from basic Approved Flight Manual.

CAUTION:

The rotorcraft glide angle is steeper than that of the basic helicopter when the AERO Design Ltd. Cargo Basket is installed.

IV PERFORMANCE

Climb performance may be reduced by up to 200 fpm.

Cruise speeds are reduced by approximately 10 kts. (11 mph).

V WEIGHT AND BALANCE

1. The following weight and balance is for the high mounted quick release cargo basket configuration, installed in accordance with drawing 76601.

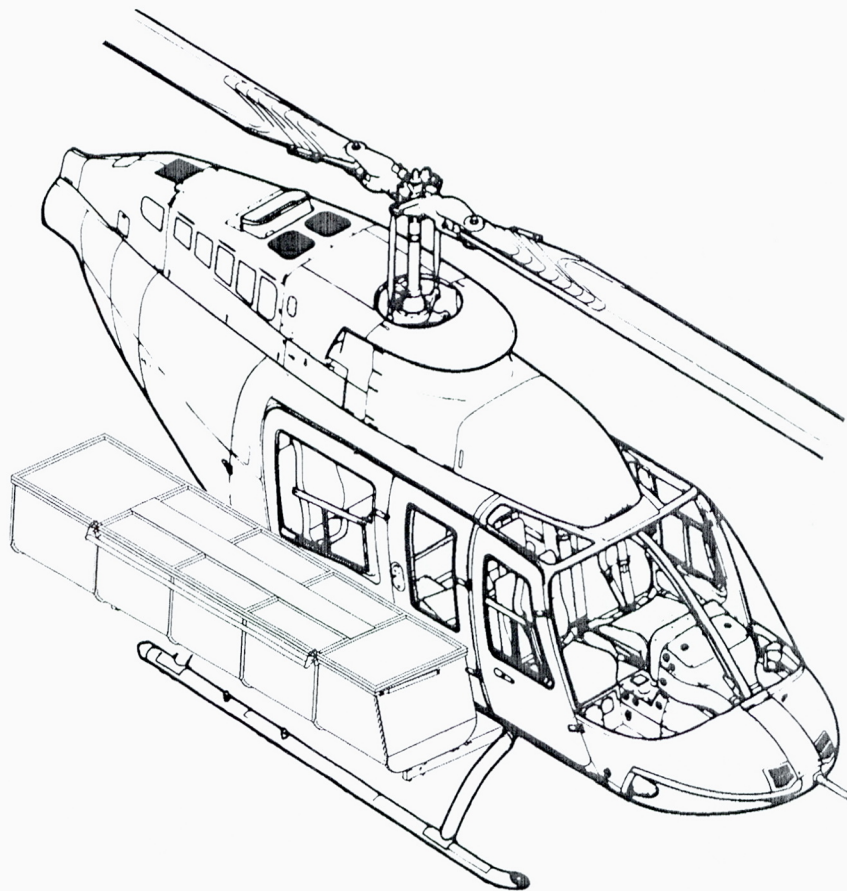


Figure 1 – High Mounted Quick Release Cargo Basket Configuration

High Mounted Quick Release Cargo Basket Configuration

Refer to section VI for definition of inboard and outboard installation.

English Units

Item	Weight (lbs)	Longitudinal		Lateral	
		Arm (in)	Moment (in-lbs)	Arm (in)	Moment (in-lbs)
Cargo Basket (Outboard)	55.5	124.4	6904.2	46.8	2597.4
Cargo (Max, Outboard)	200	124.4	24880.0	46.8	9360.0
Cargo Basket (Inboard)	55.5	124.4	6904.2	42.3	2347.7
Cargo (Max, Inboard)	200	124.4	24880.0	42.3	8460.0

Metric Units

Item	Weight (kg)	Longitudinal		Lateral	
		Arm (mm)	Moment (mm-kg)	Arm (mm)	Moment (mm-kg)
Cargo Basket (Outboard)	25.1	3160	79316	1189	29844
Cargo (Max, Outboard)	90.9	3160	287244	1189	108080
Cargo Basket (Inboard)	25.1	3160	79316	1074	26957
Cargo (Max, Inboard)	90.9	3160	287244	1074	97627

Longitudinal and Lateral moment arms are given only for the center of the Cargo Basket. Due to the length of the basket, some loading arrangements may require that actual moment arms be measured, to determine the correct moments about the center of gravity.

CAUTION:

It is possible to exceed lateral CG limits in some configurations. For example, with one pilot, no passengers, fuel tanks half empty, and the AERO Design Ltd. cargo basket loaded with 200 pounds of cargo, the Lateral CG of the rotorcraft could be out of limits.

VI INSTALLATION / REMOVAL INSTRUCTIONS

Provisions on the beams allow the basket to be mounted in either an inboard lateral position or an outboard lateral position.

If a right hand sliding door is installed the basket MUST be positioned in the most outboard lateral position to provide clearance for the door to open.

If a pop-out window is installed on the helicopter, the basket may be installed in either position, but the inboard lateral position is recommended to give a more favorable lateral C of G.

A stop is to be installed to prevent use of an incorrect keyway in accordance with drawing 76601.

Installation

Refer to Figure 2 for outboard installation. Refer to Figure 3 for inboard installation.

1. Set basket inboard attachment into inboard keyway on forward and aft beams. Slide basket to end of keyway.
2. At forward end of basket, slide basket until outboard attachment fitting hits block at edge of keyway. Push fitting into keyway and slide until locked.
3. Repeat step 2 for aft end.

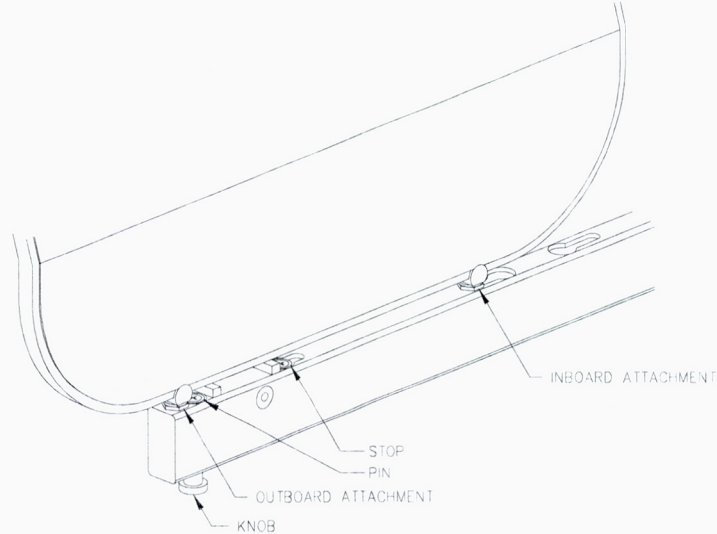


Figure 2 – Outboard Lateral Basket Attachment

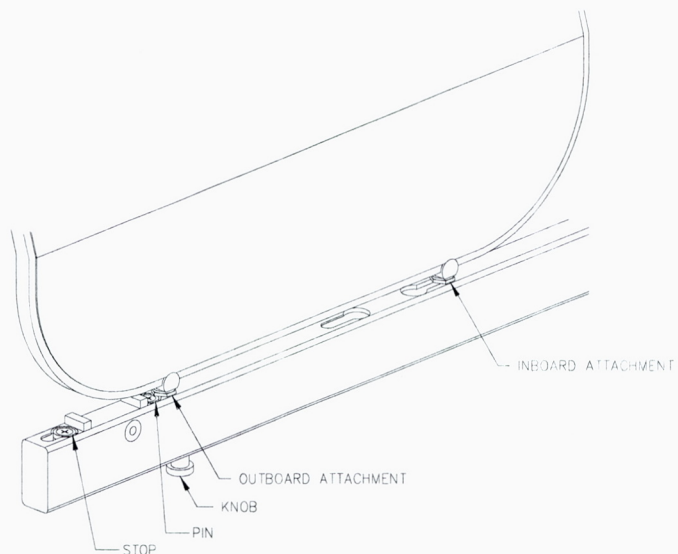


Figure 3 – Inboard Lateral Basket Attachment

Removal

Refer to Figure 2 and 3.

1. Pull knob at outboard end of forward beam and slide basket until outboard attachment fitting is free of keyway. Keep inboard attachment in keyway on beam.
2. Pull knob at outboard end of aft beam and slide basket until outboard attachment fitting is free of keyway. Keep inboard attachment in keyway on beam.
3. Slide basket until inboard attachments are out of keyway on beams and remove basket from helicopter.

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS ICA 766.90

QUICK RELEASE CARGO BASKET

Preface

These Instructions for Continued Airworthiness shall be included in the rotorcraft Maintenance Manual when the Quick Release Cargo Basket assembled in accordance with AERO Design Ltd. Document Control List DCL766-2, Revision 0, or later approved revision, is installed.

The information contained herein supplements the information in the basic Maintenance Manual. For Maintenance practices and procedures not contained in these Instructions for Continued Airworthiness refer to the basic Maintenance Manual and its approved supplements.

Revision 0
Date: 26 September, 2007

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RECORD OF REVISIONS

Revision Number	Issue Date	Date Inserted	By
0			Original Issue

LIST OF EFFECTIVE PAGES

List of Revisions Revision 0 (Original Issue) 26 September, 2007

List of Effective Pages

<u>Description</u>	<u>Pages</u>	<u>Revision No.</u>
Cover	1	0
Revision Record/List of Effective Pages	2	0
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CHAPTER 0 – INTRODUCTION

0-1 SCOPE

The following Instructions for Continued Airworthiness (ICA) satisfy the requirements of 14 CFR 27.1529, and provide the information necessary to complete the on-going maintenance and inspections required for rotorcraft embodying the Quick Release Cargo Basket as described herein.

0-2 DEFINITIONS AND ABBREVIATIONS

ICA - Instructions for Continued Airworthiness
LH - Left Hand
RH - Right Hand

0-3 DISTRIBUTION

Copies of this ICA and amendments shall be distributed to all known purchasers of the Quick Release Cargo Basket. Requests for a copy may be made in writing to:

AERO Design Ltd.
2013 39th Avenue N.E.
Calgary, Alberta
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Fax: 403-250-8333
Email: info@aerodesign.ca

Any changes will be sent to Transport Canada. All changes will be recorded in the Record of Revisions page at the front of this document.

0-4 COMPATIBILITY

Prior to incorporating this modification, the installer shall establish that the inter-relationship between this change and any other modification(s) incorporated will not adversely affect the airworthiness of the helicopter.

0-5 GENERAL DESCRIPTION

The cargo basket installation is a metal mesh basket installed to the side of the helicopter on beams attached to landing gear fittings with attachment provisions incorporated. The quick release basket allows for the installation and removal of the basket without tools, allowing a pilot operating in the field without maintenance support to install or remove the basket.

The basket itself is 96.5" long, 22.5" wide, and 20" high. It is made of a welded steel tubing structure, and lined with expanded steel mesh. The basket has a hinged lid with a self-locking handle.

The beams are steel tubing which attach to the landing gear fittings and stick out from the side of the helicopter. The quick release mechanism is built into the beams.

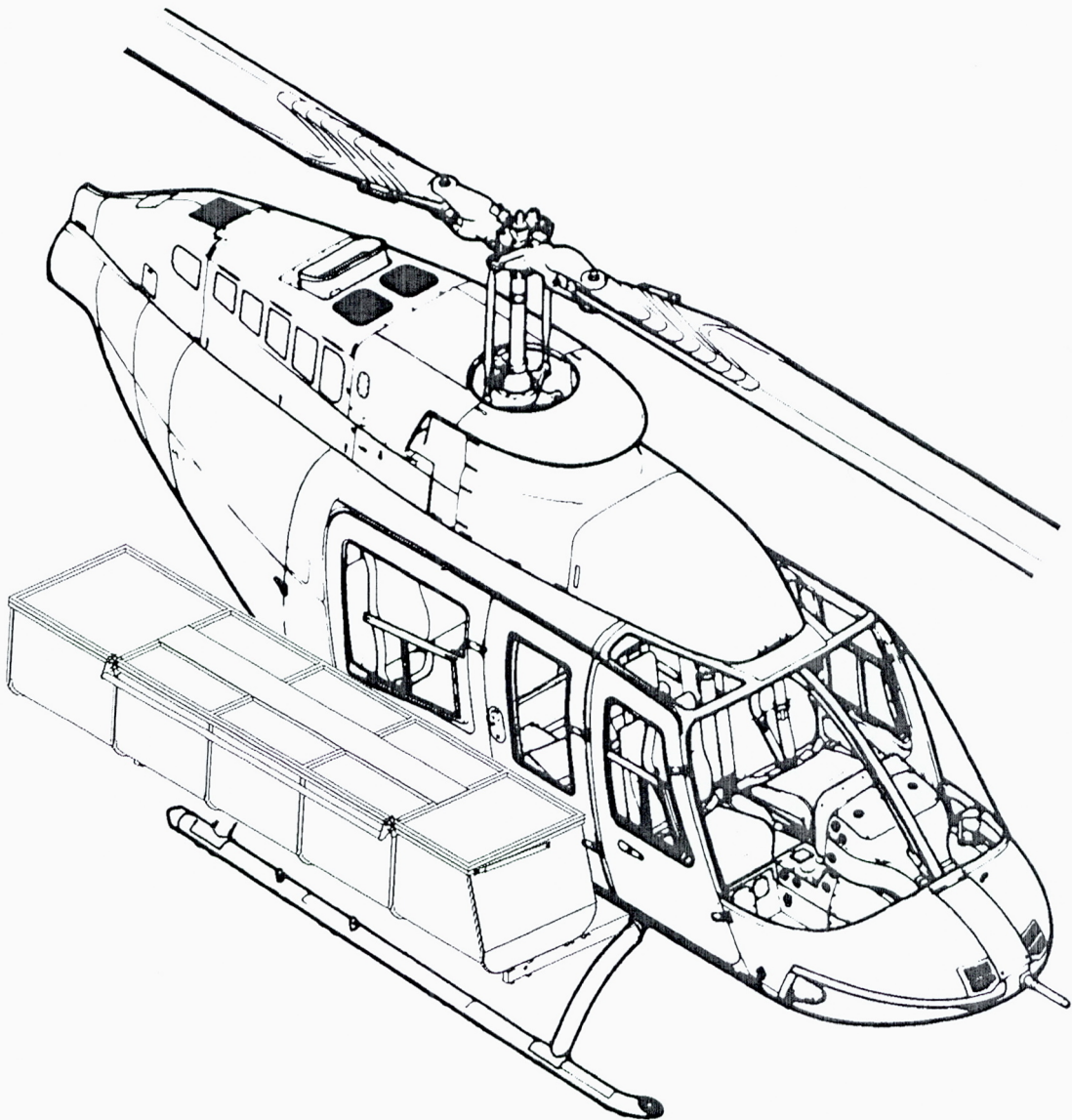


Figure 1 – Cargo Basket Installation

0-6 STRUCTURAL PROVISIONS

The External Attachment Provisions are installed on the helicopter in accordance with drawing 49301 (Bell 206L Series) or 60602 (Bell 407). That installation is separate from the basket installation. The External Attachment Provisions are not included in this ICA.

The external attachment provisions consist of replacement landing gear fittings that incorporate a barrel nut for installing equipment. Each fitting is bolted to the lower fuselage and landing gear with the same fasteners as used for the original fittings, as shown in Figure 2.

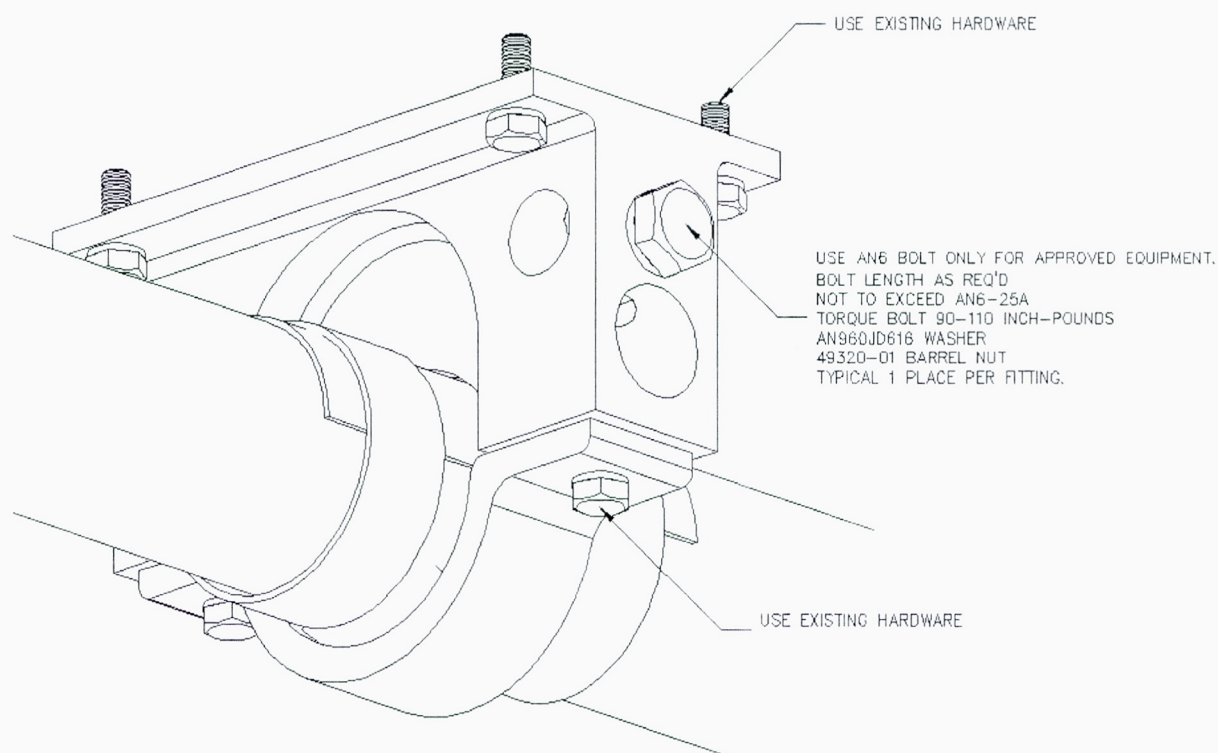


Figure 2 - Installation of External Attachment Provisions

CHAPTER 4 - AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is Transport Canada-approved and specifies maintenance required under Section 571 of the Canadian Aviation Regulations, unless an alternative program has been approved.

No additional airworthiness limitations have been imposed due the installation of the Quick Release Cargo Basket.

CHAPTER 5 – INSPECTION REQUIREMENTS

5-1 INSPECTION SCHEDULE

Continued airworthiness is contingent upon compliance with the following inspection items. These items shall be completed in conjunction with the rotorcraft Maintenance Inspection schedule, or other approved program, or upon removal and replacement of any component of Quick Release Cargo Basket.

Daily Inspection

1. Inspection Area: Basket
 - a) Inspect the basket attachment to the beams for condition and security. Ensure quick release mechanism is completely extended, flush with the upper surface of the beam.
 - b) Inspect latching of the lid for correct operation. If basket is bent inward the lid will close but may not latch.
 - c) Visually inspect lugs attaching the basket to the beams for security and damage.

300 Hour or Annual Inspection

1. Inspection Area: Basket
 - a) Visually inspect tube-to-tube welds and mesh-to-tube welds for cracks, corrosion or other damage.
 - b) Visually inspect basket mesh for damage.
2. Inspection Area: Beams
 - a) Visually inspect beams attaching basket to the helicopter for cracks, corrosion or other damage.
 - b) Visually inspect bolts attaching beams to external attachment provisions for security and damage.

Special Inspections

Following a hard landing inspect the Quick Release Cargo Basket installation in accordance with the 300 hour or annual inspection listed above.

5-2 DAMAGE LIMITS / REPAIR INSTRUCTIONS

If damage is found in the inspections above, repair in accordance with the instructions below.

1. Basket

- a) Repair Basket in accordance with AC43.13-1B, Chapter 4, Section 5, Welding, as required.
- b) Basket is fabricated from the following materials:
 - Lid and Rim: $\frac{3}{4}$ " square steel tube
 - Frames: $\frac{1}{2}$ " square steel tube
 - Mesh: $\frac{3}{4}$ " 16 ga. (0.040") expanded steel mesh
- c) Touch up with polyurethane paint as required following repairs.

2. Beams

DO NOT REPAIR DAMAGE TO BEAMS IF BEYOND THE LIMITS BELOW.

- a) Nicks and/or gouges on the top or bottom face up to 0.030" deep and 0.125" wide may be dressed out to a smooth contour.
- b) Nicks and/or gouges on the side faces up to 0.060" deep and 0.125" wide may be dressed out to a smooth contour.
- c) Limits for the keyways on the top surface of both beams is shown in Figure 3. Attempt to insert 27/64" drill shank into bottom end of slot. If drill can be inserted, slot is worn beyond limit.



Figure 3 – Keyway Limits

- d) Touch up with polyurethane paint as required following repairs.

5-3 PROTECTIVE TREATMENT INFORMATION

1. Beams

The beams are supplied powder coated white. If the powder coat is damaged, touch up with white polyurethane paint.

2. Cargo Basket

The cargo basket is supplied powder coated white. If the powder coat is damaged, touch up with white polyurethane paint.

CHAPTER 11 – MARKINGS AND PLACARDS

The following markings and placards are used with the Quick Release Cargo Basket Installation in the locations noted:

- a) Located on basket lid:



CHAPTER 25 – EQUIPMENT AND FURNISHINGS

SECTION 50 – CARGO COMPARTMENTS

25-1 BEAMS INSTALLATION

Refer to Figure 4.

1. External Attachment Provisions installed in accordance with drawing 49301 (Bell 206L Series) or 60602 (Bell 407) are required prior to installing the Beams.
2. Locate 49222-01 Forward Beam on aft side of Forward Landing Gear Fittings. Install two AN6-20A Bolt and AN960-616 Washer into Barrel Nuts in Fittings. Torque AN6 bolts to 90-110 in-lbs.
3. Locate 49222-02 Aft Beam on forward side of Aft Landing Gear Fittings. Install two AN6-20A Bolt and AN960-616 Washer into Barrel Nuts in Fittings. Torque AN6 bolts to 90-110 in-lbs.

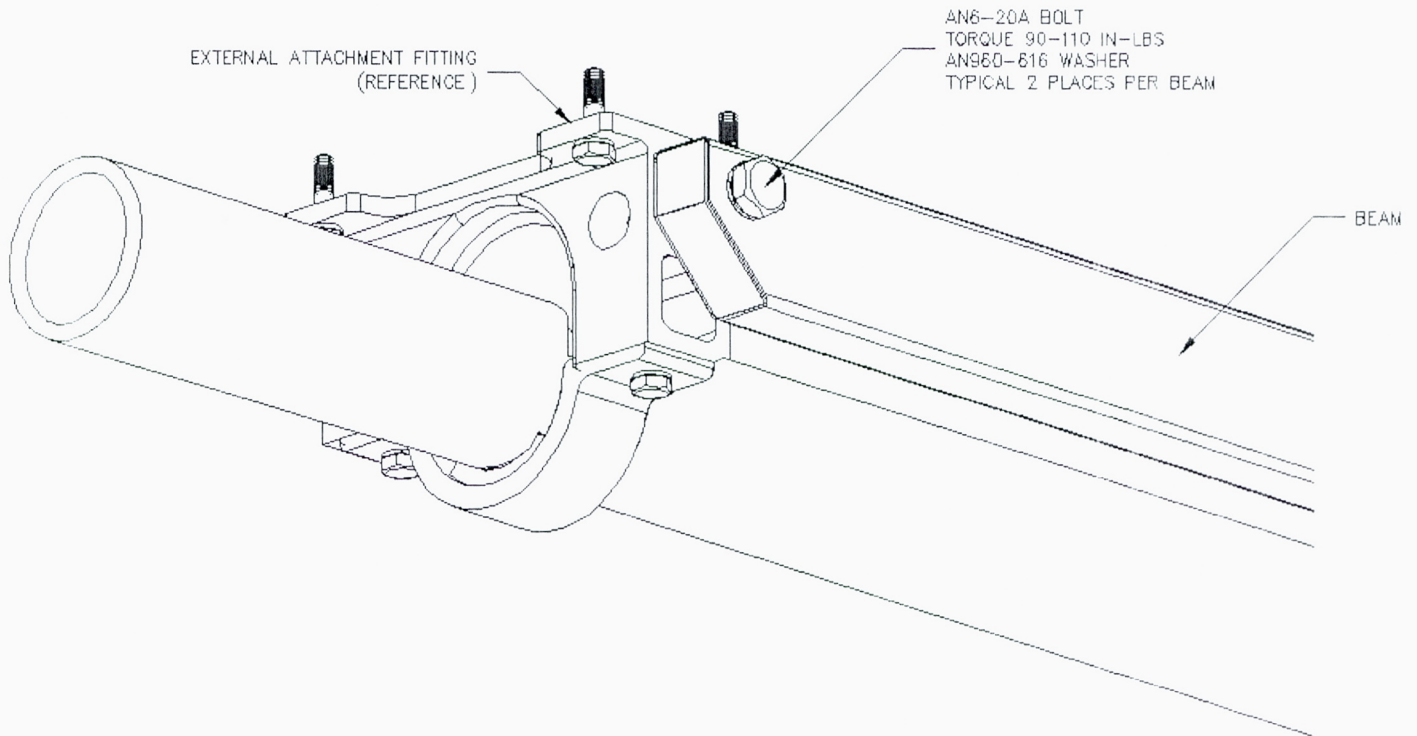


Figure 4 - Beams

25-2 BEAMS REMOVAL

Refer to Figure 4.

1. Remove Cargo Basket. Refer to section 25-4.
2. Remove two AN6-20A Bolt and AN960-616 Washer from 49222-01 Forward Beam. Remove Forward Beam.
3. Remove two AN6-20A Bolt and AN960-616 Washer from 49222-02 Aft Beam. Remove Aft Beam.

25-3 BASKET INSTALLATION

Provisions on the beams allow the basket to be mounted in either an inboard lateral position or an outboard lateral position.

If a right hand sliding door is installed the basket MUST be positioned in the most outboard lateral position to provide clearance for the door to open.

If a pop-out window is installed on the helicopter, the basket may be installed in either position, but the inboard lateral position is recommended to give a more favourable lateral C of G.

Stop (76630-14) is to be installed to prevent use of an incorrect keyway in accordance with drawing 76601.

Refer to Figure 5 for outboard installation. Refer to figure 6 for inboard installation.

1. Set basket inboard attachment into inboard keyway on forward and aft beams. Slide basket to end of keyway.
2. At forward end of basket, slide basket until outboard attachment fitting hits stop. Push fitting into keyway and slide until locked.
3. Repeat step 2 for aft end.

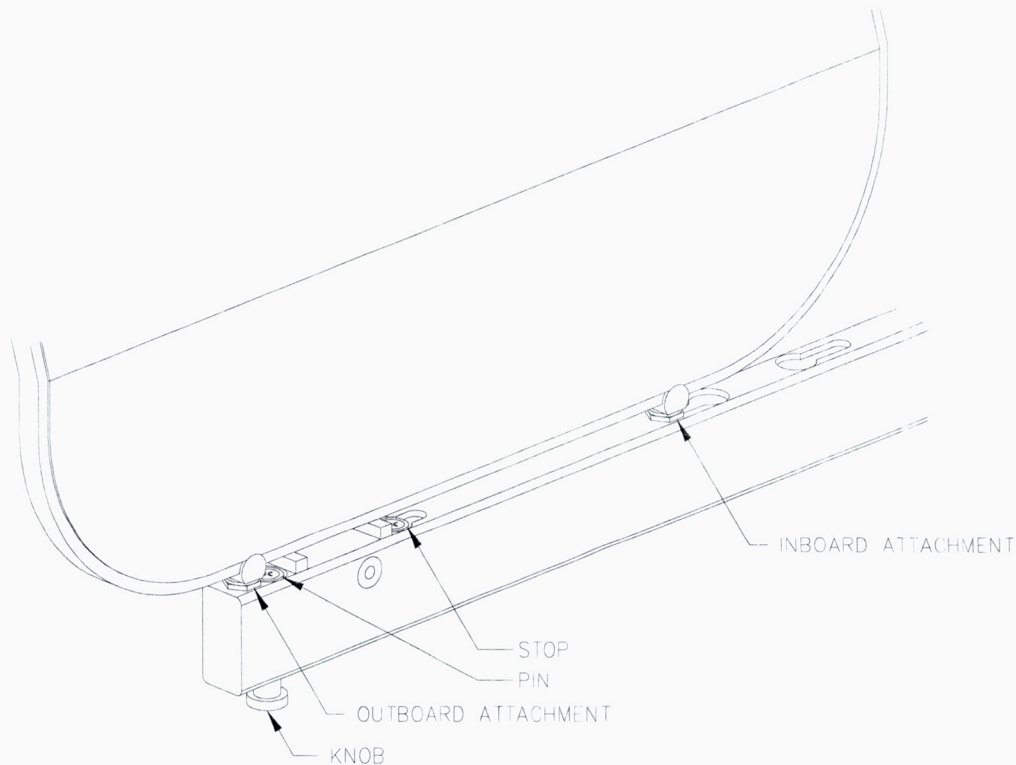


Figure 5 – Outboard Lateral Basket Attachment

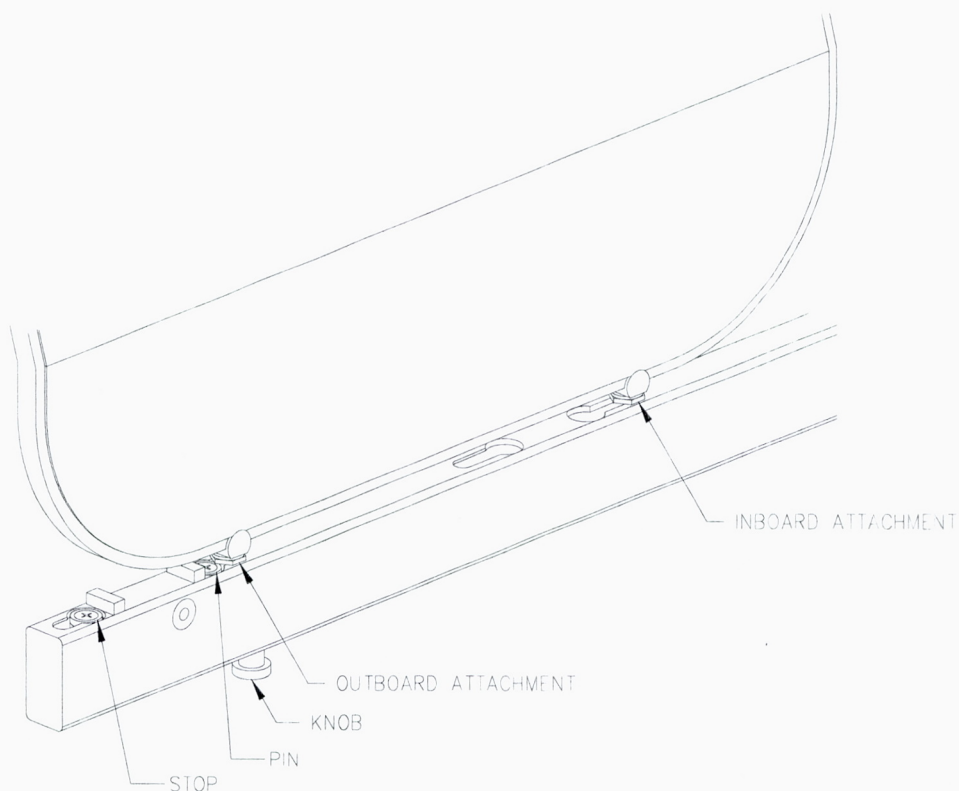


Figure 6 – Inboard Lateral Basket Attachment

25-4 BASKET REMOVAL

Refer to Figure 5 and Figure 6.

1. Pull knob at outboard end of forward beam and slide basket until outboard attachment fitting is free of keyway. Keep inboard attachment in keyway on beam.
2. Pull knob at outboard end of aft beam and slide basket until outboard attachment fitting is free of keyway. Keep inboard attachment in keyway on beam.
3. Slide basket until inboard attachments are out of keyway on beams and remove basket from helicopter.

25-5 WEIGHT AND BALANCE

Two weight and balance configurations are required for the pilot as the basket may be removed or installed in the field. The first is the installation of Beams only. The second is the complete installation of Cargo Basket and Beams.

Configuration 1 – Beams Only		Weight (lbs)	Longitudinal		Lateral	
Part #	Name		Arm (in)	Moment (in-lbs)	Arm (in)	Moment (in-lbs)
49222-01	Forward Beam	11.8	76.4	901.5	19.4	228.9
49222-02	Aft Beam	11.4	151.2	1723.7	20.9	238.3
Total		23.2	113.2	2625.2	20.1	467.2

Configuration 2A – Outboard Mounted Basket		Weight (lbs)	Longitudinal		Lateral	
Part #	Name		Arm (in)	Moment (in-lbs)	Arm (in)	Moment (in-lbs)
49222-01	Forward Beam	11.8	76.4	901.5	19.4	228.9
49222-02	Aft Beam	11.4	151.2	1723.7	20.9	238.3
76610-01	Cargo Basket	55.5	124.4	6904.2	46.8	2597.4
Total		78.7	121.1	9529.4	38.9	3064.6

Configuration 2B – Inboard Mounted Basket		Weight (lbs)	Longitudinal		Lateral	
Part #	Name		Arm (in)	Moment (in-lbs)	Arm (in)	Moment (in-lbs)
49222-01	Forward Beam	11.8	76.4	901.5	19.4	228.9
49222-02	Aft Beam	11.4	151.2	1723.7	20.9	238.3
76610-01	Cargo Basket	55.5	124.4	6904.2	42.3	2347.7
Total		78.7	121.1	9529.4	35.8	2814.9

25-6 STRUCTURAL FASTENER DATA

Refer to Bell Standard Practices Manual BHT-ALL-SPM for torque values not listed in this ICA.

23.305 Strength and deformation (Amendment 23-45)

(a) No policy available as of June 1, 1994.

(b) Intentionally Left Blank

General Comments

Certain FAA Order 8110.4 practices, about returning articles to service that have experienced ultimate load tests, may be relaxed without compromising safety. [Order 8110.4B, currently in effect, was issued several years after this example situation from Order 8110.4.] For instance, an engine mount assembly can be readily and completely inspected to determine that there is no structural damage (deformation, permanent set, material yielding). The previous FAA Order 8110.4 permits similar practice for limit load tested articles. Exercise judgment to determine which structures can properly be inspected for damage.

The interpretation of a structural failure of a static test specimen has varied greatly on past type certification programs. In the strictest interpretation, if one part fails beyond limit load but below ultimate load, the test is stopped—the part repaired—and the test rerun. The repair, in this case, becomes part of the type design. In a more liberal vein, a local failure up to ultimate load was accepted as long as the entire structure being tested was capable of carrying the ultimate load for 3 seconds. The applicant was not required to redesign or structurally “beef up” the locally failed part. In a third instance, the specimen was loaded to destruction with a continuously increasing load at a constant rate and with a continuous recording of the test results. The ultimate load was established as the load attained 3 seconds before the maximum load was recorded.

In the interest of standardization and to eliminate the wide variety of requirements imposed on different applicants by the various Aircraft Certification Offices, the following definition is used by all Aircraft Certification Offices to assess the acceptability of a failure for small airplanes in a structural static test to failure load:

Definition: A structural static failure has occurred when the article being tested cannot sustain an increase in load or cannot sustain the required load for at least 3 seconds. Local failures are allowable if occurrence is beyond limit load and if the article can reach and sustain a load without failure.

NOTE: An applicant should substantiate that the strength properties of components used in structural tests are such that subsequent components used in airplanes presented for certification will have strengths equal to or exceeding the demonstrated strength of the tested components.

If the applicant chooses to demonstrate strength capability by tests of structural components, the applicant should substantiate that the strength of the tested component conservatively represents the strength of subsequent production components. Substantiating data might include quality control data, material and process specifications, material certifications, coupon sampling tests, or other appropriate information.

An applicant may also apply material correction factors to the applied test loads to account for material variability. Applicants should use material correction factors for ultimate load tests of single load path critical flight structure and for fail-safe tests of dual load path critical flight structure with one load path failed.

Applicants do not need to use material correction factors for limit load tests or for ultimate load tests of fail-safe designs where loads from one failed component are distributed to and carried by two or more remaining components.

Utilize Structural Analyses

Often, an engineer can perform structural analyses that will substantiate airplane designs and design changes. Contact an engineer who is familiar with the FAA certification process and the particular airworthiness standards. Among others, a Designated Engineering Representative (DER) can sometimes help in this endeavor. This is another way that allows a designer or a modifier to gain FAA approval for changes to the type design. See AC 183.29-1, Designated Engineering Representatives, current edition.

Employ Static Tests

The assessment of a structure at limit load is a visual check. Deformations may be observed at limit load. However, those deformations should disappear when the load is removed. Also, any deformation that may occur at any load up to limit load should not interfere with safe operation. For example, when static testing a complete wing structure that includes installed control systems, ailerons, flaps, etc., the control systems and surfaces should perform their intended function during any deformation that may occur up to and including limit load. The FAA CAUTIONS airplane designers and certifiers to watch out for the SPECIAL EXCEPTION to FAA LIMIT and ULTIMATE load regulatory failure conditions (Euler Column Buckling). COLUMN STRUCTURES, when they are used in a (primary structure) single-load-path design application, cannot be allowed to buckle under either FAA LIMIT or FAA ULTIMATE load conditions. Two common applications of column structures are wing struts and control system pushrods. (See 23.365, Pressurized cabin loads, for additional guidance about this topic.)

Settlement of structure due to the effects of riveting, fasteners, etc., does take place during limit load tests. When testing a pressurized fuselage, the pressure differential required by § 23.365 will introduce some settlement in the rivets and fasteners. The differential pressure required is 1.33 times the maximum relief valve setting. For altitudes that exceed 45,000 feet, previously issued part 23

Ted from AC23-19A

b. Policy

(1) The intent of § 23.305(b) is that the structure must support ultimate loads without failure. The revision at Amendment 23-45, clarified that minor, local failures, and instabilities may be acceptable. The intent of the revision was to provide relief in those instances where minor, insignificant failures might otherwise result in the test being declared a failure.

(2) The revision was not intended to make any failures acceptable as long as some part of the structure was able to sustain the required loads. The original intent of the regulation remains the same; any failures before or at ultimate load are not desirable. The revision simply allows for the use of good engineering judgment, so that relatively minor local failures and structural instabilities may be discounted.

(3) Acceptable local failures or structural instabilities might include:

- A limited number of sheared rivets.
- Short cracks not extending a significant distance through the part or component.
- Localized panel buckling.
- Delaminations or disbonds over a small percentage of the part or joint area.

case by case.

(4) The following types of failures are not acceptable even if some part of the structure is able to support the required load. If the structure develops these types of damage before or at ultimate load, the test should be considered a failure.

- Any failure that causes significant load shedding or redistribution of loads. Significant load shedding is indicative that a major load path or component has failed. Load versus deflection data and strain gage data can be observed during the test to verify that the design load paths are maintained.
- Large number of sheared fasteners.
- * Widespread cracking.
- * Extensive buckling
- Large areas of delaminations or disbonds.

> N.B.

You might check

LOADS ON BASKET

Weight of basket.

$$W_{\text{basket}} = 60 \text{ lbf}$$

Cargo Capacity of basket.

$$W_{\text{cargo}} = 200 \text{ lbf}$$

Fitting Factor (Not required where compliance is shown by test)

$$n_{\text{ff}} = 1.15$$

DOWNWARD:

The basket shall support its contents under the maximum maneuvering load factor.

Ultimate Positive Maneuvering Load Factor:

$$n_{\text{man_ult}} = 5.25$$

$$P_{z_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{\text{man_ult}}$$

Ultimate Vertical Load on basket.

$$P_{z_ult} = 1365 \text{ lbf} = 55 \text{ bags}$$

FORWARD:

$$\text{limit } 260 \times 3.5 = 910 = 37 \text{ bags}$$

$$\text{lim} = 910 \text{ lb.}$$

Deflection of the basket, or shifting of its contents in the forward direction in an emergency landing does not endanger the occupants of the helicopter. However, forward deflection of the basket could block the pilot's door, so the forward load is required.

Ultimate Forward Emergency Load Factor:

$$n_{e_fwd} = 4.00$$

$$P_{fwd_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{e_fwd}$$

Ultimate forward load on basket

$$P_{fwd_ult} = 1040 \text{ lbf}$$

SIDEWARD:

Deflection of the basket, or shifting of its contents in the sideward direction in an emergency landing does not endanger the occupants of the helicopter. However, to ensure that the lid of the basket cannot open during flight, the ultimate sideward load factor will be used. The handle latches the lid closed, and is retained by a torsion spring.

Ultimate Sideward Emergency Load Factor:

$$n_{e_side} = 2.00$$

The handle must stay closed when pulled sideways with twice its weight.

UPWARD:

For attachment of the basket to the helicopter, the critical vertical load is downward, but this load factor will be used to ensure that the lid cannot open during flight or an emergency landing.

Ultimate Upward Emergency Load Factor:

$$n_{e_up} = 1.50$$

$$P_{z_lid} := W_{\text{cargo}} \cdot n_{e_up}$$

Ultimate Upward Load of cargo on lid.

$$P_{z_lid} = 300 \text{ lbf}$$

5.0 LOADS

BELL 407 HELICOPTER LOAD FACTORS, FAR 27:

FAR 27.561(c), amendment 27-24

	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} := 1.5$
	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} := 4.0$
	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} := 2.0$
	Ultimate Downward Emergency Landing Load Factor:	$n_{e_down} := 4.0$
FAR 27.625	Fitting Factor:	$n_{ff} := 1.15$
FAR 27.303	Safety Factor:	$n_{sf} := 1.5$
FAR 27.337(a)	Limit Positive Maneuvering LoadFactor:	$n_{man} := 3.5$
$n_{man_ult} := n_{man} \cdot n_{sf}$	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
	Limit Negative Maneuvering LoadFactor:	$n_{man_n} := -1.0$
$n_{man_neg_u} := n_{man_n} \cdot n_{sf}$	Ultimate Negative Maneuvering LoadFactor:	$n_{man_neg_u} = -1.5$

CRITICAL ULTIMATE LOAD FACTORS:

Downward:	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
Forward:	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} = 4.00$
Sideward:	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} = 2.00$
Upward:	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} = 1.50$

Sideward and Upward deflection or failure of the basket in the emergency landing condition do not endanger the occupants. Sideward and Upward Load Factors are used in the tests to ensure that the lid of the basket does not open in flight.

DRAG LOAD ON BASKET

	Length of basket.	$l_{\text{basket}} = 96.5 \text{ in}$
	Width of basket.	$w_{\text{basket}} = 22 \text{ in}$
	Height of basket.	$h_{\text{basket}} = 17 \text{ in}$
	Frontal Area of basket.	$A_f = 352 \text{ in}^2$
$A_p = l_{\text{basket}} \cdot w_{\text{basket}}$	Planar Area of basket.	$A_p = 2123 \text{ in}^2$
	Fineness ratio of basket	$\frac{l_{\text{basket}}}{w_{\text{basket}}} = 4.4$
	Drag Coefficient of Basket, (overestimated) (Ref. Hoerner, Fluid Dynamic Drag, Chapter 3, Figure 22).	$C_{D0} = 1.5$
	Density of air at Sea Level.	$\rho = 0.002378 \frac{\text{slug}}{\text{ft}^3}$
	Never-Exceed-Speed of 407. (Ref. 407 Flight Manual.)	$V_{ne} = 140 \text{ knots}$
$V_d = \frac{V_{ne}}{0.9}$	Dive Speed of Bell 407	$V_d = 156 \text{ knots}$
$\text{Drag} = \frac{\rho}{2} \cdot V_d^2 \cdot A_f \cdot C_{D0}$	Limit drag on basket.	$\text{Drag} = 301 \text{ lbf}$
$P_{\text{drag_ult_test}} = \text{Drag} \cdot n_{sf}$	Ultimate applied drag load on basket if compliance shown by test	$P_{\text{drag_ult_test}} = 451 \text{ lbf}$
$P_{\text{drag_ult}} = \text{Drag} \cdot n_{sf} \cdot n_{ff}$	Ultimate applied drag load on basket if compliance shown by analysis	$P_{\text{drag_ult}} = 518 \text{ lbf}$
	Lateral Aerodynamic Center of basket.	$AC_{\text{drag}} = 46.75 \text{ in}$

Make HB Keyways 1/2" longer



AERO Design Ltd.

**STRUCTURAL TEST PLAN
TP766.02**

HIGH MOUNTED QUICK RELEASE CARGO BASKET

Bell 206L Series & 407

Revision 0
Date: 26 September, 2007

AERO Design Ltd.
Engineering Consultants

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1.0 INTRODUCTION

Aero Design Ltd. is the holder of STC SH00-48 which provides for the installation of a cargo basket on the right hand side of Bell 206 L series and Bell 407 helicopters. One configuration installs the basket to the right side of the passenger cabin door. The basket is supported by aluminum beams bolted to the front and aft end of the baskets that are attached to modified landing gear attachment fittings.

It has become a desirable feature to be able to quickly remove the basket from the helicopter for both ground handling and flight operations that does not require the use of tools.

A new design for attaching the cargo basket to the support beams has been implemented that allows for quick installation and detachment without the use of tools. The aluminum beam construction has also been replaced and new beams built from 2" x 1" rectangular tubing is used.

The landing gear attachment fittings to which the basket support beams are secured are approved in STC SH00-48 and remain unaltered physically, allowable loads or the loads which are applied to them by this installation.

The cargo basket assembly is approved in STC SH00-48 and remains unchanged except for its attachment to the support beams.

The purpose of this test is to demonstrate compliance with the structural requirements FAR 27.303, 27.305, 27.307, and 27.561 to support combined drag loads at Vd (FAR 27.301(b)) and the maneuvering load conditions (FAR 27.337), and emergency forward landing conditions (FAR 29.561) with the new support beams installed.

2.0 REFERENCE

AERO Design Ltd. drawing 49222 – Forward and Aft Support Beams

AERO Design Ltd. drawing 76610 – Cargo Basket Assembly

3.0 BASIS OF CERTIFICATION

Bell 407, TCDS H-92 (Highest of Bell 206L series and 407):

FAR part 27, dated October 2, 1964 Amendment 27-1 through 27-30; Paragraph 27.561(b)(3) at Amdt 27-24; Section 27.563 at Amdt. 27-25; Section 27.785 at Amdt 27-24; Section 27.1093 at amendment 27-8; and Section 27.173 and 27.175 at amendment 27-1.

Exemptions to FAR 27 are the deletion of sections: 27.562, 27.1195, and 27.952(b)(1).

This installation:

Same as the basis of certification as shown the Type Certificate Data Sheet.

4.0 ANALYSIS OF CURRENT AIRWORTHINESS DIRECTIVES (AD'S)

AD CF-2004-03 relates to high stresses imposed on the landing gear cross tubes during run on landings, and introduces an RIN (Retirement Index Number) on the landing gear cross tubes. This installation does not affect compliance with AD CF-2004-03.

Two AD's requiring a lower V_{NE} have been issued (CF-1998-36, CF-2001-01). CF-2001-01 has been rescinded. CF-1998-36 is still in effect. This installation does not affect compliance with AD CF-1998-36, as the flight manual supplement states that if the V_{NE} of the existing flight manual is more restrictive to use the lower value.

5.0 LOADS

BELL 407 HELICOPTER LOAD FACTORS, FAR 27:

FAR 27.561(c), amendment 27-24

	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} = 1.5$
	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} = 4.0$
	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} = 2.0$
	Ultimate Downward Emergency Landing Load Factor:	$n_{e_down} = 4.0$
FAR 27.625	Fitting Factor:	$n_{ff} = 1.15$
FAR 27.303	Safety Factor:	$n_{sf} = 1.5$
FAR 27.337(a)	Limit Positive Maneuvering LoadFactor:	$n_{man} = 3.5$
$n_{man_ult} = n_{man} \cdot n_{sf}$	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
	Limit Negative Maneuvering LoadFactor:	$n_{man_n} = -1.0$
$n_{man_neg_u} = n_{man_n} \cdot n_{sf}$	Ultimate Negative Maneuvering LoadFactor:	$n_{man_neg_u} = -1.5$

CRITICAL ULTIMATE LOAD FACTORS:

Downward:	Ultimate Positive Maneuvering LoadFactor:	$n_{man_ult} = 5.25$
Forward:	Ultimate Forward Emergency Landing Load Factor:	$n_{e_fwd} = 4.00$
Sideward:	Ultimate Sideward Emergency Landing Load Factor:	$n_{e_side} = 2.00$
Upward:	Ultimate Upward Emergency Landing Load Factor:	$n_{e_up} = 1.50$

Sideward and Upward deflection or failure of the basket in the emergency landing condition do not endanger the occupants. Sideward and Upward Load Factors are used in the tests to ensure that the lid of the basket does not open in flight.

LOADS ON BASKET

Weight of basket.	$W_{\text{basket}} := 55.5 \text{ lbf}$
Cargo Capacity of basket.	$W_{\text{cargo}} := 200 \text{ lbf}$
Fitting Factor (Not required where compliance is shown by test)	$n_{\text{ff}} = 1.15$

DOWNWARD:

The basket shall support its contents under the maximum maneuvering load factor.

	Limit Positive Maneuvering Load Factor:	$n_{\text{man}} = 3.5$
$p_{z_lim} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{\text{man}}$	Limit Vertical Load on basket.	$p_{z_lim} = 894 \text{ lbf}$
	Ultimate Positive Maneuvering Load Factor:	$n_{\text{man_ult}} = 5.25$
$p_{z_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{\text{man_ult}}$	Ultimate Vertical Load on basket.	$p_{z_ult} = 1341 \text{ lbf}$

FORWARD:

Deflection of the basket, or shifting of its contents in the forward direction in an emergency landing does not endanger the occupants of the helicopter. However, forward deflection of the basket could block the pilot's door, so the forward load is required.

	Ultimate Forward Emergency Load Factor:	$n_{e_fwd} = 4.00$
$p_{fwd_ult} := (W_{\text{basket}} + W_{\text{cargo}}) \cdot n_{e_fwd}$	Ultimate forward load on basket	$p_{fwd_ult} = 1022 \text{ lbf}$

SIDEWARD:

Deflection of the basket, or shifting of its contents in the sideward direction in an emergency landing does not endanger the occupants of the helicopter. However, to ensure that the lid of the basket cannot open during flight, the ultimate sideward load factor will be used. The handle latches the lid closed, and is retained by a torsion spring.

Ultimate Sideward Emergency Load Factor:	$n_{e_side} = 2.00$
--	----------------------

The handle must stay closed when pulled sideways with twice its weight.

UPWARD:

For attachment of the basket to the helicopter, the critical vertical load is downward, but this load factor will be used to ensure that the lid cannot open during flight or an emergency landing.

	Ultimate Upward Emergency Load Factor:	$n_{e_up} = 1.50$
$p_{z_lid} := W_{\text{cargo}} \cdot n_{e_up}$	Ultimate Upward Load of cargo on lid.	$p_{z_lid} = 300 \text{ lbf}$

DRAG LOAD ON BASKET

	Length of basket.	$l_{\text{basket}} := 96.5 \text{ in}$
	Width of basket.	$w_{\text{basket}} := 22 \text{ in}$
	Height of basket.	$h_{\text{basket}} := 17 \text{ in}$
	Frontal Area of basket.	$A_f := 352 \text{ in}^2$
$A_p := l_{\text{basket}} \cdot w_{\text{basket}}$	Planar Area of basket.	$A_p := 2123 \text{ in}^2$
	Fineness ratio of basket	$\frac{l_{\text{basket}}}{w_{\text{basket}}} = 4.4$
	Drag Coefficient of Basket, (overestimated) (Ref. Hoerner, Fluid Dynamic Drag, Chapter 3, Figure 22).	$C_{Do} := 1.5$
	Density of air at Sea Level.	$\rho = 0.002378 \frac{\text{slug}}{\text{ft}^3}$
	Never-Exceed-Speed of 407. (Ref. 407 Flight Manual.)	$V_{ne} := 140 \text{ knots}$
$V_d := \frac{V_{ne}}{0.9}$	Dive Speed of Bell 407	$V_d = 156 \text{ knots}$
$\text{Drag} := \frac{\rho}{2} \cdot V_d^2 \cdot A_f \cdot C_{Do}$	Limit drag on basket.	$\text{Drag} = 301 \text{ lbf}$
$P_{\text{drag_ult_test}} := \text{Drag} \cdot n_{sf}$	Ultimate applied drag load on basket if compliance shown by test	$P_{\text{drag_ult_test}} = 451 \text{ lbf}$
$P_{\text{drag_ult}} := \text{Drag} \cdot n_{sf} \cdot n_{ff}$	Ultimate applied drag load on basket if compliance shown by analysis	$P_{\text{drag_ult}} = 518 \text{ lbf}$
	Lateral Aerodynamic Center of basket.	$AC_{\text{drag}} := 46.75 \text{ in}$

6.0 STRUCTURAL COMPLIANCE

6.1 Beams

Strength of the beams and the attachment of the basket to the beams is demonstrated by test. The aft beam is critical since the positioning of the left and right landing gear attachment fittings are closer together for the aft l/g cross-tube than the forward l/g cross-tube.

6.1.1 Test Setup

A jig was fabricated to simulate the helicopter attachments. Two large steel tubes were drilled to match the actual mounting positions of the front and rear attachments, and were then welded to a large I beam.

Forward and aft beams were fabricated in accordance with drawing 49222, Revision 2. The beams are installed on the jig fabricated above, using AN6 bolts as they would be installed on the helicopter.

A basket (without lid) was fabricated in accordance with drawing 76611. The basket is installed on the beams in the outboard position (critical position).

The drag and forward load is applied by pulling on the front face of the basket with a chain, using a come-along attached to a load cell. The maneuvering load is applied by stacking bags of lead shot inside the basket, evenly distributed front to back.

The test setup is shown in the following pictures.

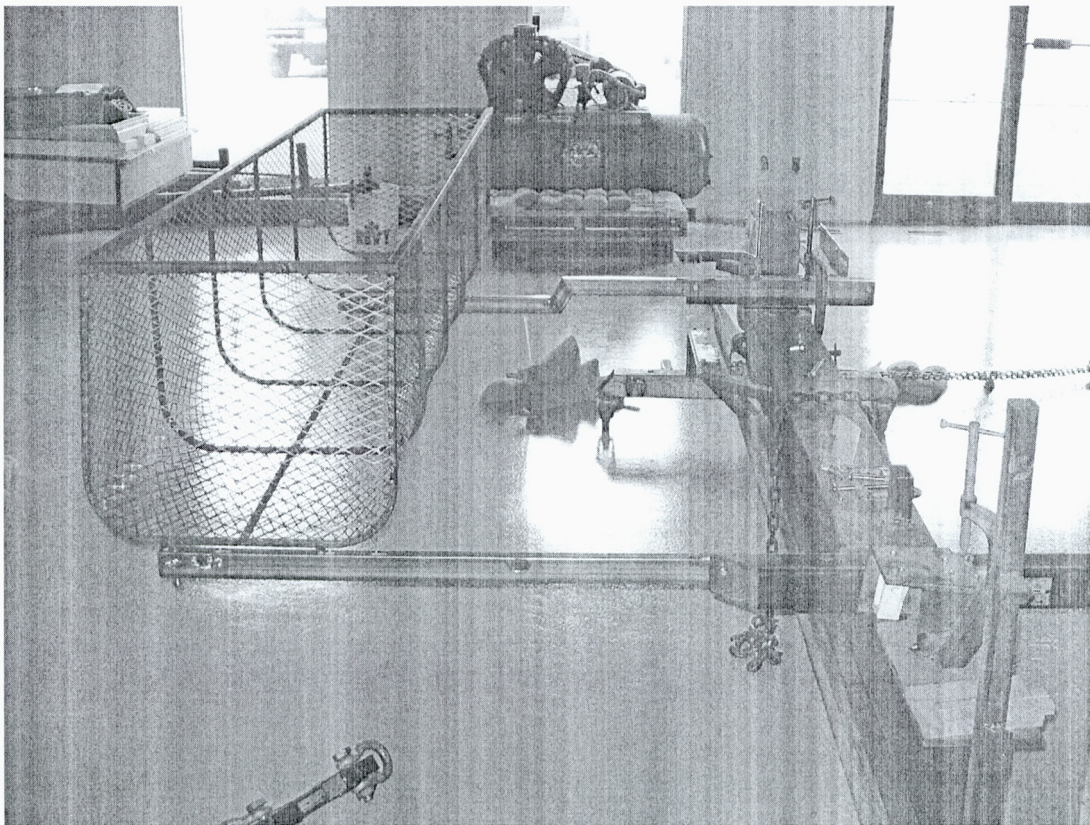


Figure 1 - Complete Test Setup, looking aft as installed

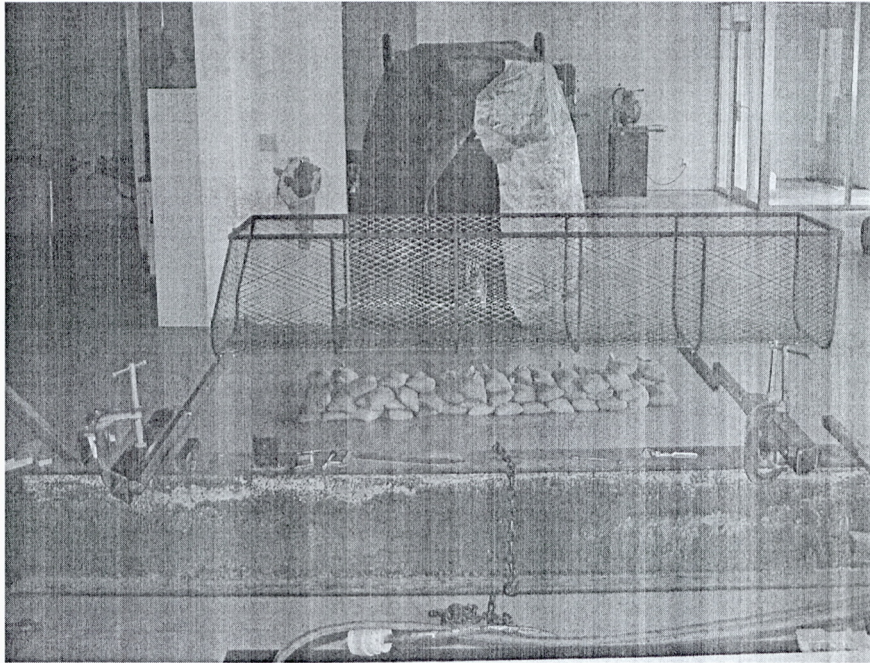


Figure 2 - Complete Test Setup, looking outboard



Figure 3 - Beam Attachment, Forward

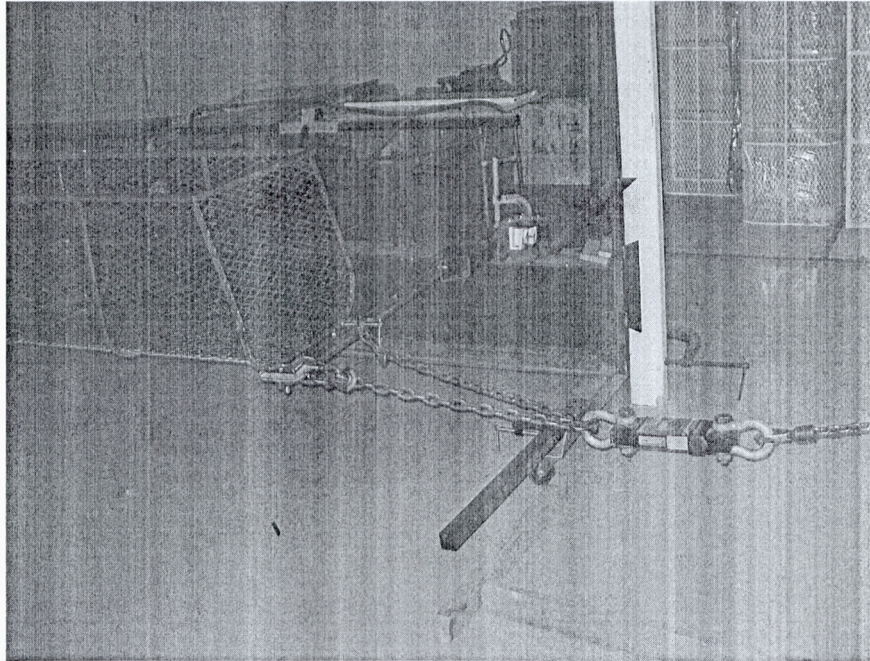


Figure 4 - Drag Load Application

6.1.2 Test – Forward

Ultimate forward load is applied separately from other loads.

Ultimate forward load = 1040 lbs

1028

The ultimate forward load test must demonstrate that there is not more than 1" of permanent forward deflection after the load is removed. This is to ensure the pilot's door is not blocked after the emergency landing condition has been experienced.

6.1.3 Test – Limit Maneuvering and Drag

Limit maneuvering and drag loads are applied simultaneously.

Required loads:

Maneuvering load = 894 lbs

Drag load = 301 lbs

The basket applies 1g down. Only the basket body is used, which weighs 31.5 lbs

Applied Maneuvering Load = $910 - 31.5 = 862.5$ lbs

The lead shot is in 25 lb bags, 875 lbs is required (35 bags)

After application of the load for at least 3 seconds, the loads are to be removed and the structure inspected for signs of permanent deformation.

6.1.4 Test – Ultimate Maneuvering and Drag

Ultimate maneuvering and drag loads are applied simultaneously.

Required loads:

Maneuvering load = 1341 lbs

Drag load = 451 lbs

The basket applies 1g down. Only the basket body is used, which weighs 31.5 lbs

Applied Maneuvering Load = $1341 - 31.5 = 1309.5$ lbs

The lead shot is in 25 lb bags, 1325 lbs is required (53 bags).

Ultimate loads are to be applied for a minimum of three seconds without structural failure.